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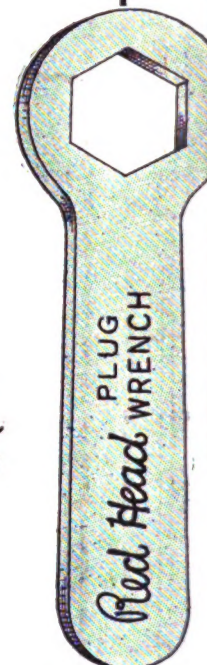
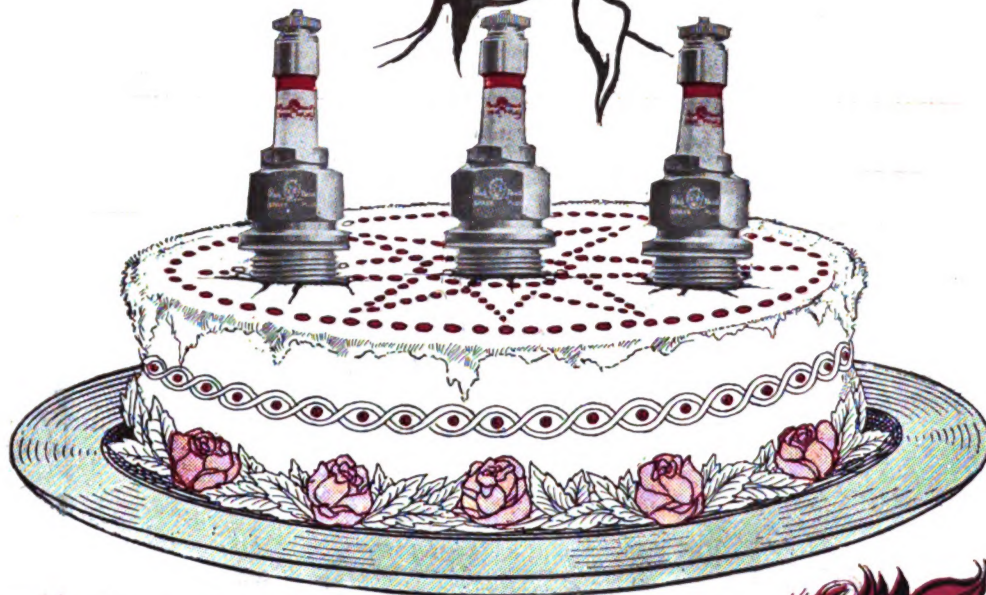
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Red Head

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I was inaugurated March 4, 1909—the same day as President Taft. When I took the oath of office, I knew that I was better fitted than any other spark plug to serve the people. To-day, a happy family of over 1,000,000 RED HEADS have been elected by the motor industry throughout the world.

But I would feel disappointed if I could boast only of the largest **national** sale. I am jubilant on this occasion because I am the **accepted Standard for Service**.

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5 Red Head Magneto Plugs at \$1.00,	\$5.00	
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1 extra porcelain or mica core,	.50	
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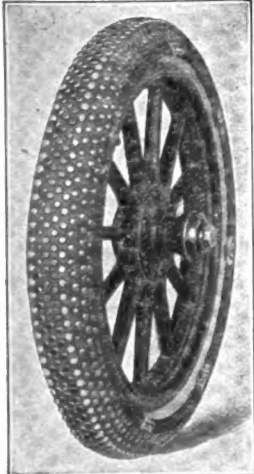


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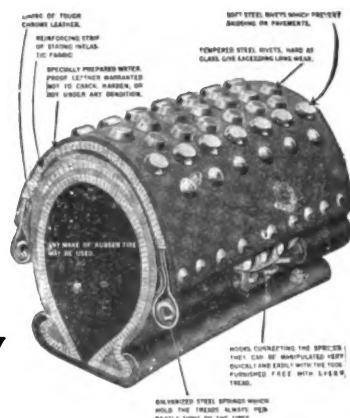
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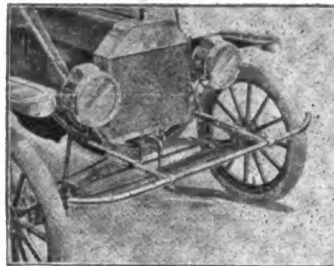
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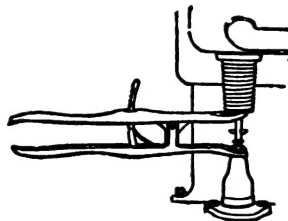
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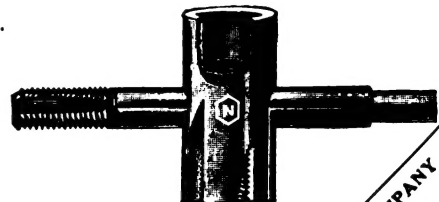
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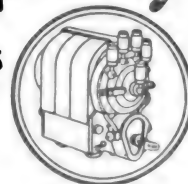
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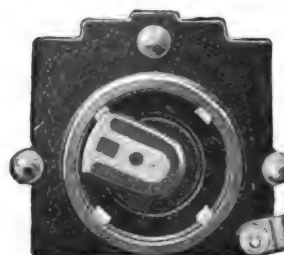
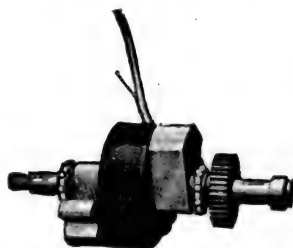
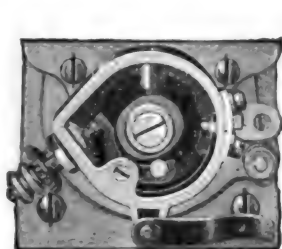
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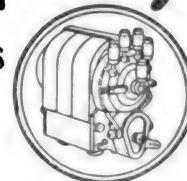
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But such lists in the larger States now contain not only all new owners but also all owners re-registering year after year.

You can't tell one from the other and two-thirds of your work is wasted because the time a man buys accessories is for the first six months after he gets his car.

And this is the very time when you can reach the new owner only by direct advertising. He does not take any trade paper, as a rule, until later.

Our list of 450,000 names

is all kept on index cards. All registrations are checked against this list and all dead names eliminated. This last item alone makes the ordinary list unprofitable within six months unless so checked.

Our list is depended upon absolutely by the largest concerns in the automobile field as being not only the most complete but the most reliable. It has taken seven years to make it so and we are at it yet. Of this you get the benefit every time we do work for you.

Our charges

are high enough to enable us to give you the best possible service.

If you will write us we will be glad to give you the details of our Direct Service Plan and of how it may be applied to your work.

Automobile Advertising Company
381 Fourth Avenue
New York City

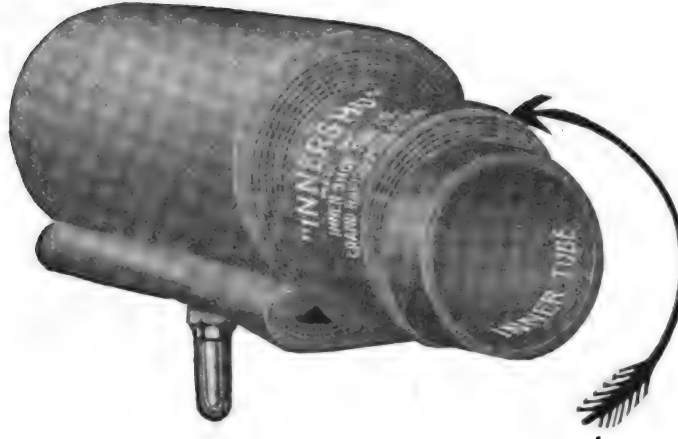


Insist on this
Label

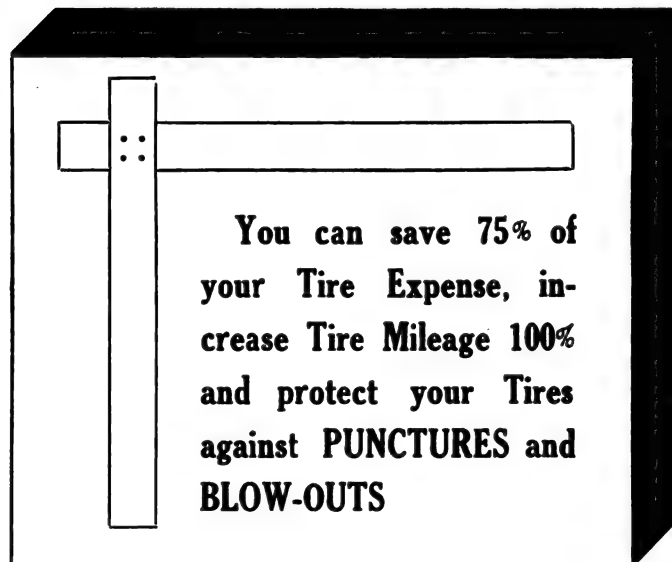
THE "INNERSHU"



It is found on
Every "Innershu"



A 100% Increase in Tire Efficiency
GUARANTEED



**We will ship DIRECT IF not represented in
your territory**

INNER SHOE TIRE CO., Grand Rapids, Michigan

Please mention the Automobile Dealer and Repairer when writing to advertisers.

Mr. Dealer, You Know

You, who are close to the oil question, know that all oils are **not** alike. You know that there is as much difference between oils as there is between cigars.

Surely, **you** know the value of a perfect lubricant. Why not impress the need of it upon the car-owner? Most owners will gladly pay a little **more** for oil—when they understand **why** they are paying it.

PANHARD OIL

is the highest quality which can be produced.

It is refined from the best oil in the world—Pennsylvania Crude. Will not carbonize unless fed too freely. Keeps its body at high temperatures.

The uniform quality of Panhard Oil sends the user back for more—and assures you of sales and resales—today, tomorrow, next month and next year.

Wherever there are automobiles, there is a latent demand for Panhard. There's money for you in stirring it up. We are advertising Panhard in the best general and trade papers of the country. Our list includes

Saturday Evening Post	Motor
Collier's	Cycle and Auto Trade Journal
Literary Digest	Motor Print
Life	New England Auto Journal
Review of Reviews	Auto Dealer and Repairer
	Motor Boat

Why not reap the benefit of this advertising? Stock Panhard Oil. Display Panhard signs. Best of all, **tell** your customers you have it.

Write today for our "Help Sell" plan.

George A. Haws

67 Pine Street New York City

Principal Distributing Stations :

Boston, Chicago, San Francisco, Omaha,
Columbus, O.; Minneapolis, Dallas, St. Louis,
Los Angeles, Portland, Ore.



ONE TOUCH OF "BUCKEYE" MAKES THE WHOLE WORLD CLEAN

BY CLEAN we mean all that the word implies. "BUCKEYE CLEANSER" doesn't stop with the top layer of dirt, it gets right down underneath the bottom layer and really cleans things clean.

For cleaning the automobile "BUCKEYE CLEANSER" hasn't a rival. It's the one soap that keeps the car looking like new. When you give your car a "BUCKEYE" bath, it's just like having it revarnished. It washes the car as it should be washed and makes it shine with "BUCKEYE" BRIGHTNESS.

Around the home you will find "BUCKEYE CLEANSER" an ever ready, faithful servant. It cleans anything and everything, piano, furniture, floors, carpets or any of the other hundred and one things around the home that have to be kept clean. It is made from pure vegetable oils and does not contain a single harmful ingredient.

And outside of all these good features, "BUCKEYE CLEANSER" is economical. A can of it will go twice as far as any other soap. We want you to know just how good "BUCKEYE CLEANSER" is. We're willing to have you make the first trial at our expense. Just drop us a postal requesting a free sample.

By the way, "BUCKEYE CLEANSER" is also used for keeping buildings clean.

THE J. P. DAVIES COMPANY

DAYTON, OHIO.

"BUCKEYE CLEANSER" is sold by dealers, jobbers and garages everywhere.

GRAY & DAVIS

Lamps and Lighting Dynamo System

We Want Agents!

The demand for GRAY & DAVIS lamps and our famous Electric Lighting Dynamo has far exceeded our present selling organization.

We require additional agents. We are now assigning certain territory. We want to cover the entire country thoroughly. We want to be able to give purchasers of GRAY & DAVIS Lamps and Dynamo, the same satisfactory attention and service which they would receive in dealing with us direct. You will want this agency.

GRAY & DAVIS products are sweeping the field—they are universally acknowledged to be best. We offer business men of integrity—live men of ability—a selling proposition that is most profitable and pleasant.

Grasp the Opportunity. Write us Today

We will appoint but one agent in every locality where we haven't representation. To such, we are prepared to offer a selling arrangement that is very attractive. If you want to be identified with a great automobile lighting organization—communicate at once.

WRITE SALES MANAGER

GRAY & DAVIS, 55 Lansdowne St., Boston, Mass.

Gray & Davis Lamps

We make the highest quality of automobile lamps. Our line includes, Electric, gas-electric, gas and oil lamps for all positions on the car. Our Limousine lamps are marvels of beauty. GRAY & DAVIS Lamps possess exquisite style and are recognized as superior in light-giving power.

Manufacturers of AUTOMOBILE LAMPS


Lighting Dynamo System

The GRAY & DAVIS Dynamo is universally acknowledged to be best. It lights all or part of the lamps. It is operated by the motor and requires but 1/8 H. P. Needs no attention. It is the only system that has the CONSTANT SPEED feature. It is beautiful in appearance and highly efficient.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

Superior Drop=forgings



There's service in the  trade-marked products and you should have it.

This company originated and developed the means for the best possible care of Nut and Cap Screw-moving conditions and in the selection of "Big-Six" set assure you maximum service in least number of wrenches—capacity for all principal bolts and screws from $\frac{1}{4}$ to 1 inch; for every nut and screw about the chassis or engine.

Circular No. 117 is an interesting one to dealers and owners and a postal card will secure it.

See your dealer or communicate directly if must.

J. H. WILLIAMS & CO.

Superior Drop-Forgings

17 RICHARDS ST., BROOKLYN, N. Y.



TIRES. TUBES. TIRES.

STANDARD MAKES.

Highest grade stock, comprising of the best manufacturers. Cannot advertise names on account of the reduced prices we are selling them at.

Every tire is guaranteed brand new, perfect in every respect, and are not more than six months old. Some of these have the names of the makers on and others are buffed.

We thoroughly examine and test every tire and tube under heavy pressure to detect any weakness before shipping.

These are not the kind usually advertised. Nothing but the best stock is quoted in this ad.

Casings to fit Clinchers, Quick Detachable or Dunlop Straight Side Tires.

Size	Casing	Tube	Size	Casing	Tube
28x3	\$9.50	\$3.50	35x4	\$22.00	\$5.25
30x3	10.75	2.75	36x4	19.50	5.40
32x3	10.50	3.00	37x4	22.50	5.75
28x3½	12.00	3.00	32x4½	20.00	5.50
29x3½	14.50	3.15	33x4½	28.00	5.60
30x3½	14.50	3.75	34x4½	28.50	5.75
31x3½	15.00	3.75	35x4½	24.50	6.00
32x3½	15.00	3.90	36x4½	25.00	6.10
34x3½	15.75	4.15	37x4½	25.00	6.20
36x3½	15.00	4.25	34x5	20.00	6.00
30x4	16.50	4.60	35x5	25.50	6.25
31x4	17.00	4.75	36x5	26.00	6.50
32x4	17.50	4.90	37x5	28.00	6.75
33x4	19.00	5.00	37x5½	30.00	7.00
34x4	19.50	5.10			

Take advantage of these prices while they last, as we cannot guarantee how long these prices will stand good.

We guarantee these tires and tubes to be strictly 1911 goods.

We are one of the oldest and largest tire mail order houses in the United States, and you do not have to hesitate to send us an order with cash accompanied, as we can refer you to any Commercial Agency or Bank in New York, as to our references.

We agree to refund your money if goods are found unsatisfactory upon receipt.

We Ship Goods Subject to Examination.

INSIDE TIRE PROTECTORS.



Prevent blow-outs, punctures, and greatly increase mileage. No need of throwing away old tires that are not worth repairing. Simply apply the inside tire protector and the old tire is given new life again and will add many miles of additional service. It covers the whole inside of casing to the head and is thus a blow-out patch extending all the way round. It is an acknowledged fact that 75% of all tires break down or blow out in the fabric before the rubber

is half worn out, thus losing half the mileage. These tire protectors are made from 8 to 6 ply of Egyptian fabric, with a self-seal flap reinforcing the rim and sides, always the weakest parts. We strongly advise placing these protectors in new tires, thus keeping them sound by releasing the strain, and the earlier a tire is equipped with them, the longer its life and the greater its mileage. Tube pinches are eliminated by the use of these protectors.

Order a complete set of them and save 100% on your tire expense.

Size	Reg. Price	Cut Price	Size	Reg. Price	Cut Price
28x2½	\$4.65	\$2.40	35x4	\$7.00	\$4.90
28x3	4.75	2.60	36x4	7.75	5.00
30x3	4.90	2.85	32x4½	7.25	5.00
30x3½	5.25	3.35	34x4½	7.50	5.10
32x3½	5.50	3.55	35x4½	7.60	5.25
34x3½	5.75	3.95	36x4½	8.00	5.50
30x4	6.20	3.75	34x5	8.10	5.60
31x4	6.25	4.00	35x5	8.25	5.75
32x4	6.49	4.20	36x5	8.50	6.00
33x4	6.60	4.40	37x5	9.00	6.50
34x4	6.75	4.75	37x5½	9.25	6.75

Owing to the fact that our profits are very small, we sell for cash only, and under no circumstances otherwise.

C. O. D. orders filled if 10% is accompanied with order, to show good faith.

Send for complete list.

EXCELSIOR TIRE CO.,

1777 Broadway,

New York City, N. Y.

MICHENER'S GASOLINE SAVER

Breaks up and remixes the gasoline globules with a spray of air, increases the power and reduces Gasoline Bills $\frac{1}{4}$.

It is a well understood fact that a mixture of gasoline and air correctly proportioned to develop the greatest possible power under heavy loads, in the engine, is far too rich for light loads. This not only causes a waste of fuel, but also causes unnecessary deposit and heating of the jacket water.

To be continually changing the adjustments of the carbureter in order to prevent waste of gasoline, on one hand, and to develop a maximum of power on the other, is impracticable and inconvenient.

By means of the Michener Gasoline Saver, you can correct the mixture to all conditions of load and speed by simply turning a small lever on the dash as you drive along, without disturbing the carbureter adjustments. It is simply a hand controlled device for admitting auxiliary air above the carbureter. Its opening is from the smallest up to $\frac{9}{16}$ ths of an inch.

When the valve is opened the engine draws in a spray of air through the wire gauze cone and as it strikes the gasoline mixture rising from the carbureter, it has a tremendous mixing effect. With the hand control on the dash you are able to make the mixture perfectly homogeneous and in the correct proportions for developing the maximum economy and power. The wire gauze cone also prevents dirt and dust being drawn into the cylinders.

The modern carbureter, although a marvel of automatic flexibility, has to be adjusted so that all speeds will be equally well taken care of. If the carbureter were set so that the highest possible efficiency were obtained at high speeds it would probably be impossible to start the engine.

One of the most important factors is getting the gas into the cylinders with the least possible resistance, but by using this device you can reduce the air resistance to a minimum, without sacrificing the starting or low speed adjustment; also compensation for altitude is easily made without disturbing the normal air adjustments of the carbureter. High altitudes reduce the air taken in per stroke because of the low barometric pressure and consequently an over-rich mixture is the result.

IT IS FINE FOR PRIMING when the motor is hard to start, by pouring a little puddle of gasoline in the mixer bowl and giving the air valve a small opening before cranking.

HERE'S ANOTHER GREAT FEATURE THIS DEVICE HAS: When coasting down a grade, by turning off the ignition switch, and opening the air valve of the Gasoline Saver full, allowing the motor to act as a brake, the suction of the engine draws in the pure air through the wire gauze cone, which cools the cylinders and also saves the gasoline.

Made of Solid Brass, Polished. Can be installed in a few minutes.

When ordering state side of motor carbureter is on.

PRICE COMPLETE, \$5.00, Including Rod and Dash Connections.

MICHENER'S CHAIN CARBON REMOVER

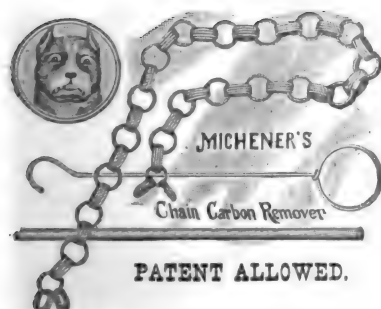
Has had the most phenomenal sale of any accessory ever put on the market. It is the most logical and only safe device of its kind, is just a flexible, small coil chain, made of soft, tough wire, a special composition—90% copper.

Guaranteed to remove the carbon from a cylinder—top, sides and piston head. Simple operation: just poke the chain through a spark plug hole, cut off the ignition on this cylinder, then run the motor a couple of minutes with the power of the remaining cylinders.

Now used and recommended by many manufacturers and garages. Always state kind of motor when ordering.

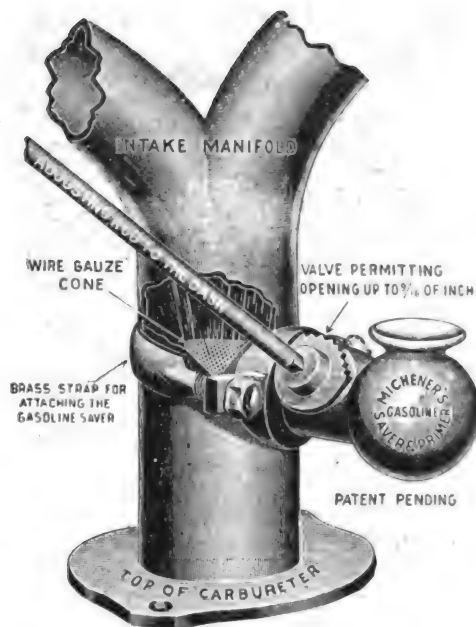
PRICE 75c., THREE FOR \$2, POSTPAID.

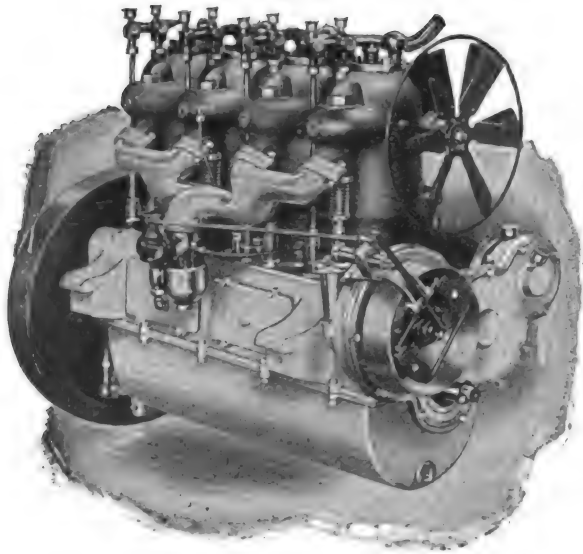
You can clean two cylinders at the same time with two chains.



E. S. MICHENER, 800 Washington St., New Castle, Pa.

Please mention the Automobile Dealer and Repairer when writing to advertisers.





No. 11.—Single cylinder, stationary engines, 2 to 125 H. P.

That we furnish engines for farm tractors, railway locomotives and commercial vehicles of all kinds, is evidence of the range of our work and the stability of our construction.

Model Gas Engine Works

Lock Box 2002, PERU, IND.

OUR LINE IS COMPLETE.

WRITE for the following catalogs of the line in which you are interested:

No. 18.—General construction of all motors from $3\frac{1}{2} \times 4\frac{1}{2}$ to 5×6 , cone clutches and transmissions.

No. 20.—30 to 40 H. P. unit power plants with 4 forward speed transmissions and governor.

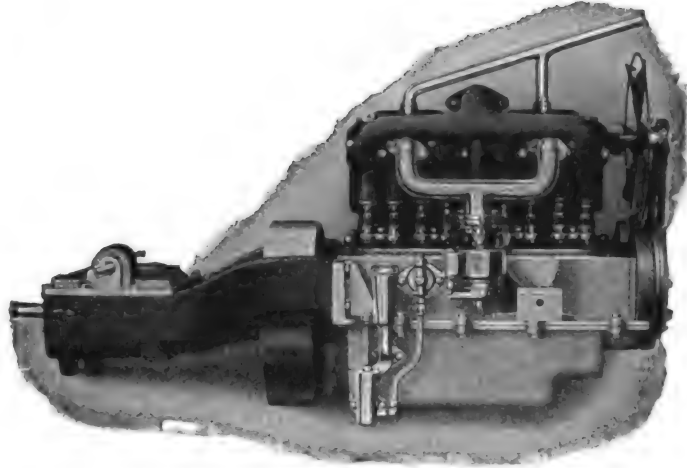
No. 21.—22 H. P. unit power plants with 3 forward speed transmissions.

No. 19.—Wells clutch.

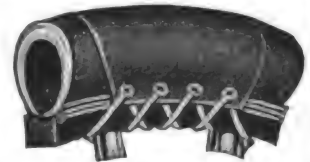
No. 17.—4 cylinder, marine engines, 12 to 500 H. P.

No. 16.—4 cylinder, stationary engines, 12 to 500 H. P.

No. 15.—4 cylinder, stationary engines (suction gas type), 25 to 500 H. P.



ATTENTION!



MR. AUTOMOBILE MAN.

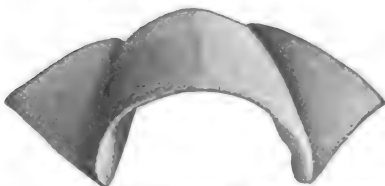
We are in position to supply you with Reliners and Blowout Patches that will Give Service.

Without a doubt we have a line of goods that are far superior to any make on the market, and we can refer you to the 1000's of jobbers and dealers who are now handling our products with *great success*. We use only Genuine Sea Island Fabric, and guaranteed by us or money refunded. A trial order will convince you.

Write for Catalog and Prices.

AMERICAN RUBBER PRODUCTS CO.,

230 SOUTH CLINTON
STREET,
CHICAGO, ILL.



Please mention the Automobile Dealer and Repairer when writing to advertisers.



Ohio Electric Coupe, Equipped
with
**HESS-BRIGHT
BALL BEARINGS**

Pure versus Partial Rolling Action

The first essential of a durable anti-friction bearing is *pure rolling action*.

One reason among others for the failure of early three and four point bearings to endure serious work is that, with anything but two point contact, there was nearly always a twisting as well as rolling motion at the points of contacts. This was true, however the shapes of cups and cones might be varied.

The twisting and consequent rubbing is avoided with either the annular or two point cup and cone types. An important advantage of the annular type lies in the fact that it is not subject to faulty adjustment in careless hands.

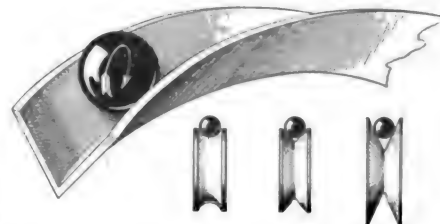
More than any other form of anti-friction bearing, the two point annular type realizes in practice the great durability theoretically attendant on complete absence of rubbing friction.

It is least affected by shaft deflections and by distortion of the supporting framework;—partly for the reason that balls (unlike rollers) cannot thereby be caused to run askew and abrade their races.

Under proper conditions of design, as exemplified in Hess-Bright Ball Bearings, cramping due to the same adverse influences is also avoided. These influences (distortion and the like) cannot be wholly eliminated. Their effects may be, however, and the life of good annular ball bearings can be more confidently predicted than that of any other types of anti-friction bearings.

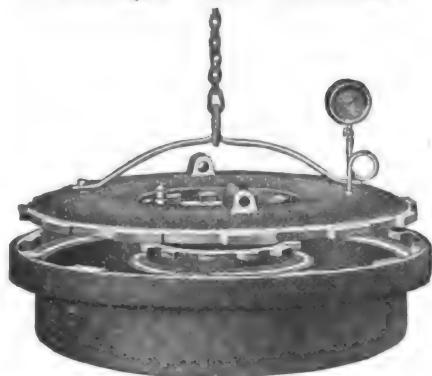
The HESS-BRIGHT Data Sheets and Catalog should be in every engineer's library. Are they in yours?

THE HESS-BRIGHT MANUFACTURING CO.
2114 Fairmount Ave., Philadelphia, Pa.



MAKE MONEY REPAIRING TIRES

BOLTLESS TIRE KETTLES



CASING REPAIR VULCANIZERS
AIR COMPRESSORS and TANKS
STEAM BOILERS
INSIDE PATCH VULCANIZERS
TUBE REPAIR VULCANIZERS
POT HEATERS and STEAM VULCANIZERS
COIL SPRINGS FOR RETREADING
RETREADING MOLDS
ROTARY RASPS
WIRE BRUSHES, Etc., Etc.

The Boltless, Quick Opening Tire Kettle and other devices shown in our New 1912 Catalogue insure best results from the smallest investment.

With this kettle you can cure a retread as easily as a sectional repair. **There is not a single bolt to tighten.**

Give your customers quick service by curing retreads as fast as they are built up.

You can make money repairing tires either as part of a garage and general repair business or as a separate venture. Requires very little capital to equip a shop completely with the best tire repairing outfit in the world. The equipment can be paid for and a good profit made by the first season's work. Every motorist must have tires repaired—every motorist in your vicinity is a possible customer for tire repairing.

Get the right kind of equipment—one that produces work that you can guarantee—the Akron-Williams Tire Repair Equipment which was designed by practical tire factory repairman.

Localized heat is the secret of the Akron-Williams. Three separate steam chambers in each of our sections, our exclusive patented feature, limit the curing process to the repaired part.

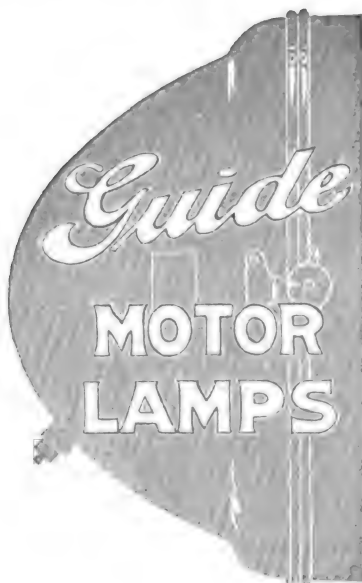
Proof that the Akron-Williams is the best is the fact that the big tire manufacturers use it—Firestone, Goodyear, Diamond, Republic, Pennsylvania, Revere, Hartford, Consolidated, Empire, Manhattan, Shawmut and many other tire manufacturers are among our customers. They know by experience what is most practical. We can equip a tire repairing plant of any desired capacity. Don't delay getting into this profitable business.

Get into correspondence with us to-day.

THE WILLIAMS FOUNDRY & MACHINE CO., Glendale Avenue, Akron, Ohio

Guide

This name on the name-plate of a lamp means that the Guide Co.'s experience and reputation are behind that lamp. Four years of concentrated effort on doing one thing and doing it well. We said—"We will make good lamps and sell them at a right price"—and we are doing both.



Guide

We have made this name something more than a trade mark. We have gone further than the perfecting of lamps that are efficient and that stand up in service.

Our catalogs and our correspondence tell you the other things you need to know about lighting by electricity.

When you write for our catalog and booklet, "The Truth About Automobile Lamps," tell us the make and model number of your car. Tell us also how many lamps you want to operate, whether you want new lamps or will put electric fittings into your present lamps. We ought also to know how you are fixed for recharging the battery and whether you want high or medium power in your headlights.

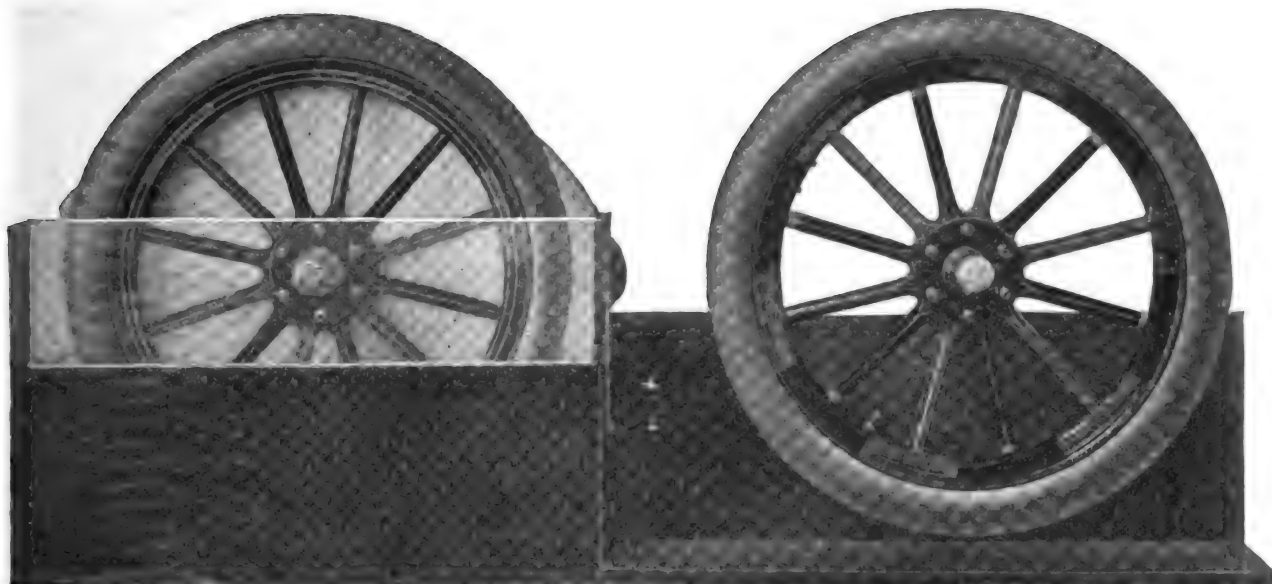
GUIDE MOTOR LAMP MFG. CO.,

2069 EAST 4th STREET

CLEVELAND, OHIO

Please mention the Automobile Dealer and Repairer when writing to advertisers.

The Varnish That Defies Soap



A startling demonstration of a Varnish absolutely unharmed by the caustic action of automobile soap—a feature of our exhibit at the automobile shows this winter.

Very likely you have seen the wheel revolving in the soapy water at our booth and have noted that the finish on half the spokes remained in perfect condition, while that on the remaining spokes lost its lustre before your eyes.

Six of the spokes of the wheel are finished with the best automobile gear varnishes heretofore made. They cannot withstand soap. The other six spokes are finished with

VALENTINE'S VANADIUM CHASSIS FINISHING

These spokes stand up absolutely unharmed after weeks of exposure to soap and water.

Every automobile manufacturer, every dealer, every owner knows, after sad experience, that there has been no finish until now that has not been literally eaten up by soap. The condition of the hood, fenders and all the underparts of every

automobile, after a few months of use is testimony for all the world to see.

VALENTINE & COMPANY'S NEW VARNISH

on a chassis will remain in perfect condition for months after other varnishes have been ruined. Prove this varnish for yourself.

We have prepared small pieces of tin, varnished on one side with one of the best known automobile gear varnishes and on the other side with Vanadium Chassis Finishing Varnish. If this tin is left in a strong solution of soap—say a pound to the gallon—for thirty minutes the old-fashioned gear varnish will lose its lustre. Our Vanadium Chassis Finishing will remain unharmed.

This bath in a strong soap solution is equivalent to a month or more in the garage.

Write for this tin. Just fill out the coupon and we will send it to you at once with attractive descriptive booklets.

VALENTINE & COMPANY

**257 Broadway,
New York**

**343 So. Dearborn St.,
Chicago.**

**74 Pearl Street
Boston.**

Name.....
Address.....
City.....
State.....
Cut off and mail to
Valentine &
Comp'y

Please mention the Automobile Dealer and Repairer when writing to advertisers.

DEALERS MAKE MONEY SELLING DELCO APPARATUS

Effective February fifteenth, the retail sales of Delco ignition apparatus which have heretofore been handled by the Kellogg Switchboard and Supply Company, of Chicago, will be taken over by the Retail Sales Department of the Delco Company at Dayton.



In addition to the present complete line of battery ignition, we will offer the new combined electric lighting and ignition system, which can be applied to practically any car.

The demand for electric lighting systems for cars now in use is becoming greater every day. Because of the tremendous prestige of Delco products, this demand will largely flow to dealers who sell Delco goods.

Wire or write us for territory reservation.

The Dayton Engineering Laboratories Co.
DAYTON, OHIO, U. S. A.

"The Brake Lining of Quality"



Has been adopted by several of the Leading Manufacturers and Dealers of the Country.

Proof of its Quality and Merit.

ORDER

MULTIBESTOS

Tests have proven it surpasses all others in the essentials.

"Braking ability under all conditions of service."

"Durability."

"Resistance to effect from heat."

Write for Descriptive Matter, Prices, etc.

Standard Woven Fabric Company
Worcester, Mass.

Our New No. 8 Adjustable Sectional Vulcanizer With Three Cavities



As a Progressive Business Man you should by all means use, handle or recommend our

New Improved Auto-Tire VULCANIZING MACHINE

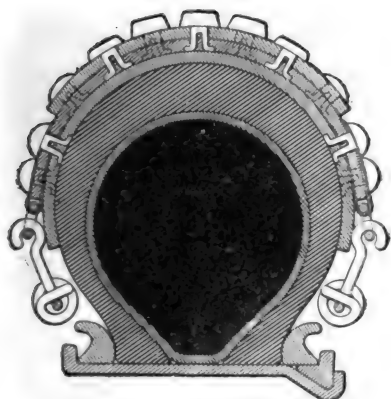
simply and solely because it is the best there is in Vulcanizers at any price and because the price isn't much, the operation is easy and profits are exceptionally large.

Our machine is different, far better and more economical in operation and investment cost than any other made. In all features it is so superior to all other devices there is hardly a comparison. We have some facts that will interest you and that will put you in the way of big profits. In your own interest, get posted—Write to us to-day.

Auto-Tire Vulcanizing Co., Lowell, Mass.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

The A. S. B. Triple Leather Tire Protector.



THE A. S. B. Treads are made of 3 thicknesses of leather from the best imported hides. It is Chrome Tanned in the U. S. and is guaranteed to us. It is ten times tougher than rubber. A ten-penny nail will bend before it will go through it. It is next to impossible to puncture it. Our leather is waterproofed. It will not get hard nor crack after being exposed to water or snow. These Treads are all full-steel-studded, with hard steel studs in the center. The side rivets are of a softer steel to better prevent skidding.

Our Treads are self-adjusting, as our springs on the sides of the Tread are made of No. 10 gauge steel wire of the very best and are $\frac{5}{8}$ of an inch in diameter. This makes a perfect, strong spring and keeps the Tread tight on the tire at all times. The springs are much nearer the center of the wheel than the face of the Tread. This gives them greater leverage, or rather tension, and is bound to keep them tight. These springs never lose their spring quality as they are made of the right diameter for a No. 10 gauge premier steel wire. They allow flexibility. That relieves the tires of practically all side strain and eventually prevents blow-outs, for the side strain is what wears and breaks the side-walls of the casing and causes blow-outs. These springs keep the Tread on straight and tight. They do not slip and crawl on the tire and destroy the power of your car at times when your power is most needed. We feel safe in saying the A. S. B. Treads are the only self-adjusting non-creep Treads made.

Our Guarantee! We guarantee the A. S. B. Treads to not heat, chafe, rot or injure your tires in any way. If they are not everything we claim them to be, you can return them at the end of 10 days' trial and we will refund your money. The A. S. B. Treads are not an experiment. They have been tested out for the past two seasons. They are giving universal satisfaction and are doing the business. As they do not slip and crawl on the tire we are safe in backing up every A. S. B. Tread that leaves our works with the above Guarantee.

They will more than double the life of your tires and will do away with at least 95 per cent of your tire troubles and that means cutting your tire up-keep expense to a minimum. We Guarantee 4000 miles wear without puncture. Some of the drivers abuse their Treads the same as they would their tires and we are obliged to place the mileage that low, but with decent usage under ordinary conditions they will give from 8 to 10 thousand miles wear. That depends entirely on the condition of the roads traveled and on the manner in which the driver handles the car.

The side-openings prevent the sides from puckering or pocketing. They will not pick up dirt nor sand. They aid in cooling the tire. By an actual test it was proved that tires equipped with A. S. B. Treads run several degrees cooler than the naked tires.

We want an Agency in every town in the U. S. If there is no Agent in your territory, we will make you a Special Price on a full set of four in order to get them on a car where all the Car Owners can see just what we they are. The Treads will get the Repeat Orders, and that is what we are after.

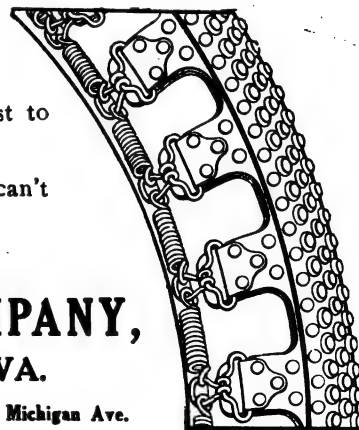
If you are tired of paying excessive tire bills, it will be to your interest to write us for prices, terms, etc.

If you are a Dealer, we have a proposition to offer you that you can't afford to pass up.

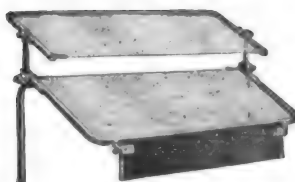
Our References—Any Bank in our City.

Factory Address. **QUEEN MANUFACTURING COMPANY,**
Lock Box 224, WEBSTER CITY, IOWA.

Agencies—Dallas, Texas, c/o Box 616. Cincinnati, Ohio, 77 Perin Bldg. Chicago Branch, 1346 Michigan Ave.
Address all B. & L. Caster Front Automobile Axle enquiries to our Chicago Office.

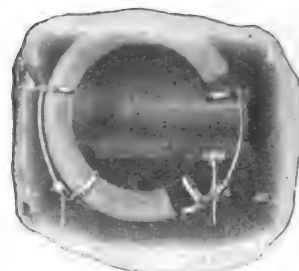


PATENTED FEB. 27, 1912.

Badger Running Board
Tire Holder

Badger Wind Shields

PATENT APPLIED FOR

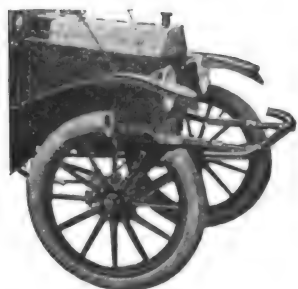
Badger Rear End Demountable
Rim and Tire Holders**AUTO PARTS MFG. CO.****(Badger Accessories)**

Manufacturers of HIGH GRADE AUTO PARTS

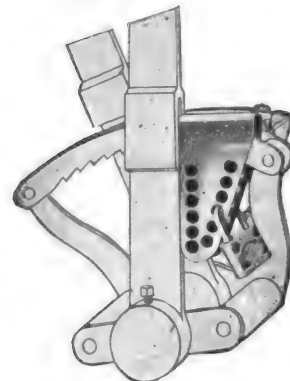
Badger Rain Vision Wind Shields

- " Clear " "
- " One-Piece " "
- " Zig Zag " "
- " Running Board Tire Holders
- " " Demountable Holders
- " Rear End Demountable Rim and Tire
- " Holders
- " Ford Bumpers
- " Standard Bumpers
- " Clamp Locks
- " Vulcanizers
- " Foot Warmers
- " Symphony Horns
- " Foot Rails
- " Robe Rails
- " Standard Foot Pedals

Badger Ford Bumper

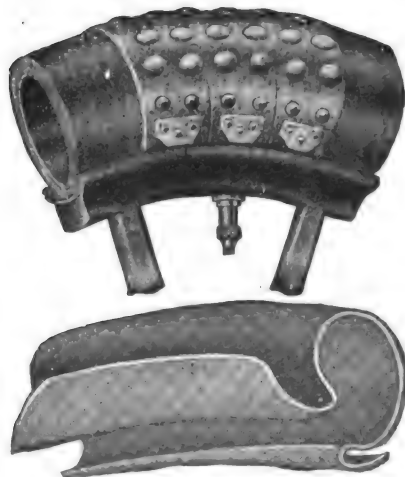


Badger Lock Clamp

**AUTO PARTS MFG. CO.**

161-171 Michigan St., Milwaukee, Wis., U.S.A.

SEND FOR CATALOGUE

**A PERFECT OUTSIDE AND
INSIDE EMERGENCY PATCH**

**GUARANTEED
TO SATISFY
YOU OR IT
COSTS YOU
NOTHING.**

Relieves the
longest trip of all
apprehension
of danger.

Jno. Y. Whiteman, Biggsville, Ills., says:

"I have run my own car almost 11,000 miles, and have never carried an extra casing one mile, but never go without your Patches. In fact, I recall one case in which I had a Blowout and one of your Patches brought me home 300 miles, without any trouble."

Standard size, 8-inch. \$2.00. PREPAID to any address.
MONEY BACK IF YOU ARE NOT SATISFIED.
Good proposition to offer LIVE DEALERS.

Write for "TIRE SENSE."

20TH CENTURY TIRE PROTECTOR CO.,

Main Office and Factory, MIDLOTHIAN, TEXAS.

Dallas Office, 411-12 Slaughter Building, Dallas, Texas.

Adamson AUTO-VULCANIZER EVER-READY

PATENT PENDING.



ONLY practical method of repairing tubes, producing a perfectly vulcanized patch.

IT is the only portable vulcanizer made, constituting an ideal repair kit, weighing only three pounds.

WITH the Auto-Vulcanizer a tube is patched in 15 minutes anywhere, on road or at home, producing a substantial and everlasting repair.

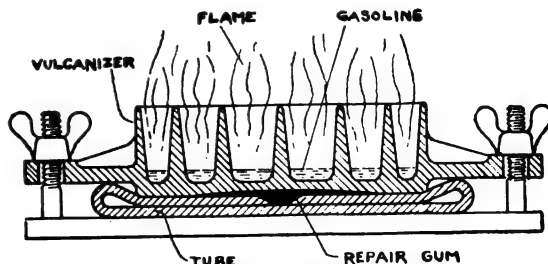
IT is so very simple, yet performs its work so perfectly, due to a remarkably unique principle.

NO automobile owner can afford to be without this wonderful outfit at such a reasonable price.

\$8.50

With the AUTO-VULCANIZER no cement or acid is used, the repair gum is simply placed on the tube, according to directions.

The AUTO-VULCANIZER is applied by simply clamping it centrally over the prepared patch and tube as illustrated.



PATENT PENDING.

To vulcanize the patch, one ounce of gasoline, measured by using the small bottle, is placed into the vulcanizer and ignited with a match. From the time the gasoline is ignited the vulcanizer should remain in place 15 or 20 minutes.

THE ADAMSON MANUFACTURING CO., East Palestine, Ohio.

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Going! Going! Gone!!

The Careless Expensive Way.



A New Tire

After 400 miles the tire is cut by a sharp stone or a piece of glass.

After 800 miles, the tire cut has been enlarged and one edge torn loose from the fabric.

After 1200 miles, the hole is still further enlarged and dirt has been forced under the tread forming a "sand-pocket."

After 1500 miles, the inner-tube has blown clear through the casing--throw it into the junk-heap

This first series of pictures shows the life of an average tire, *your tire*, under ordinary every-day treatment. A small cut, a little neglect, sand and water ground into the hole every time the wheel goes around, the result is always the same, rotted fabric and a ruined tire.

Next time you dig up \$40.00 for a new casing, just remember that it is money thrown away. The old tire might just as well have run 10,000 miles. The new one *will* run 10,000 miles if you vulcanize it with a

SHALER Vulcanizer

The Shaler Way.

Clean the cut with gasoline and sand-paper.

Fill the hole with Para Rubber.

Clamp on your Shaler Vulcanizer for a few minutes.

Result, a perfect weld of the old and new rubber. A blow-out avoided; tire as good as new.

This series shows the life of a tire taken care of in the *Shaler Way*. You or your chauffeur can do the work. The Shaler book of instructions explains every detail of the process perfectly.

Get a Shaler Vulcanizer, go over your tires once a month and seal the cuts and sand-pockets with new, live Para rubber. Rotting of the fabric, blow-outs, and other tire trouble will be eliminated. *You will make one tire outwear three.*

The Shaler is a complete outfit for tire repairs. It is the only vulcanizer with a temperature control that is *automatic*. No attention required after you put it on the tire. Best of all, you don't have to take the tire off the wheel--the job is done in less time than it requires to remove and replace a tire.

Get a Free Copy of this Book.

"Care and Repair of Tires" tells what you need to know about every tire emergency. A new edition is just off the press. We'll mail you a copy free if you ask for it while the edition lasts.

C. A. Shaler Co., 802 4th St., Waupun, Wis.

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Pitner Pump

98% Efficient

The only tire pump guaranteed for five years' service, and costs only \$1 a year.

It has an air-tight piston which utilizes 98% of your energy in compressing air. Other pumps waste as much as 20%.

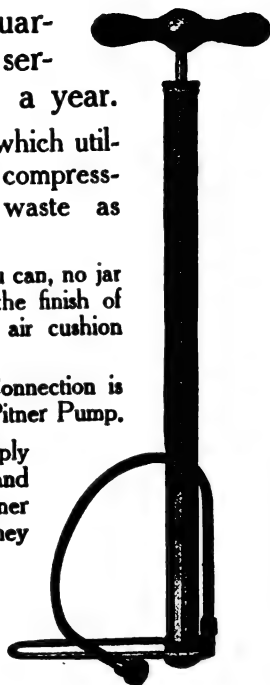
Pump as fast and hard as you can, no jar to you or the pump—even at the finish of a long, powerful stroke. The air cushion prevents striking bottom.

The Can't-Pull-Off Hose Connection is another exclusive feature of the Pitner Pump.

If your dealer cannot supply you send us his name and \$5, and we'll send you prepaid a Pitner Pump on 10 days' trial. Money refunded if not satisfactory.

Pitner Pump Co.

1214 So. Michigan Ave.
CHICAGO, ILL.



HAVING YOUR SHARE OF TIRE TROUBLES?

SURE YOU ARE!

Like most other troubles they start small but grow fast. The time to cure them is when they start or before! That bad spot in your tire—small cut maybe—means a blowout after the sand and water get in their work.

IN A HURRY?

No time to take it off and send it in for repairs today! Run it a while anyhow! A little later,

BANG!!!

The chances are that when this happens you will be somewhere out on the road, possibly **MILES FROM HOME**. Do you realize your predicament? Annoyance? Cost for repairs and worst of all, **THE DELAY**, waiting for the repair man? By owning a

LEADER PORTABLE VULCANIZER

You can repair the trouble right on the spot in a few minutes and do it yourself.

Send us your address on a postal and let us tell you all about it by return mail; it will pay you.

THE LEADER MFG. CO., Cleveland, O.

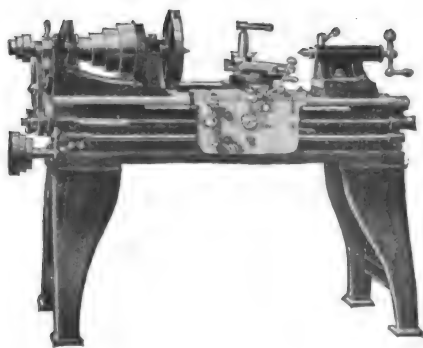
Agents Wanted in Every Locality.



Repairing a
BLOWOUT
as it is in
Operation.

Pat. Oct. 22,
1911.

SEBASTIAN 15-INCH LATHE



The LOW-PRICE, PERFECT-QUALITY lathe for the GARAGE and GENERAL REPAIR SHOP.

If you are in the market for a lathe be sure and investigate the merits of the SEBASTIAN.

CATALOG mailed free on request

THE SEBASTIAN LATHE CO.

108-110 Culvert Street, Cincinnati, Ohio

IDEAL Lawn Mower Grinder

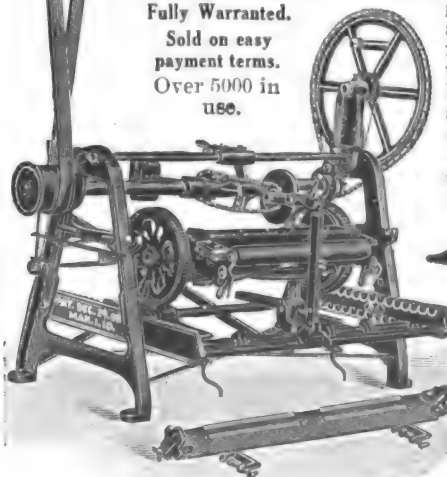
Grinds all makes of mowers perfectly in 15 minutes, without removing wheels, ratchets or reel knife. Operated by either hand or power. Ball bearing Aluminum Grinding Wheel and Main Shaft. New 1912 Model will grind straight blade without removing from mower. Has Skate Sharpener Attachment for sharpening skates.

WRITE TODAY for full information of this great labor-saver and money-maker. Will do the work so much better, quicker and easier, you cannot afford to do without it. Write today. Don't delay.

Fully Warranted.

Sold on easy payment terms.

Over 5000 in use.

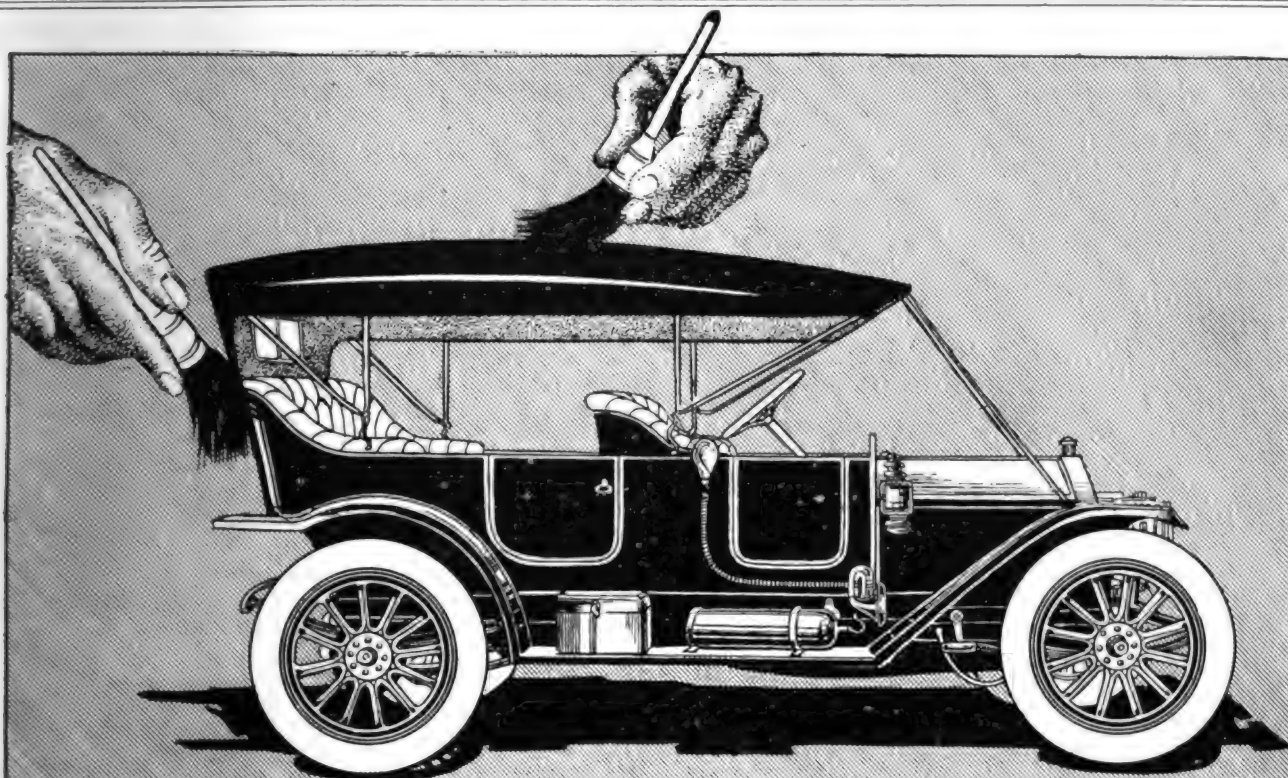


great labor-saver and money-maker. Will do the work so much better, quicker and easier, you cannot afford to do without it. Write today. Don't delay.

**THE HEATH
FOUNDRY
& MFG. CO.
PLYMOUTH
OHIO**

"You Grind It as You Find It."

Please mention the Automobile Dealer and Repairer when writing to advertisers.



Make Your Auto-Top Last Longer

Give it a bright, clean, new look. Make it weatherproof, waterproof, sun-proof, and—last longer.

You, yourself, can make it all these—quickly and inexpensively.

How? We have put our half-a-century's experience into the answer to that very natural question—

Felton-Sibley AUTO-TOP DRESSING

half a century's knowledge of how to develop and manufacture a dressing that's ready to use when you get it, that's easy to apply, that dries quickly, but won't crack afterwards, that will make your auto-top new-looking, weatherproof, and more durable.

Eight standard colors of "F-S" Auto-Top Dressing: Auto Gray, Golden Brown, Jockey Red, Raven Black, Bright Vermilion, Pullman Car color, Dark Carriage Green and Royal Blue. Special shades to order.

Send today—now—before you forget it—for color card and prices.

Felton, Sibley & Co.

Incorporated

Manufacturers of Colors, Paints and Varnishes

136-140 N. FOURTH STREET
PHILADELPHIA.

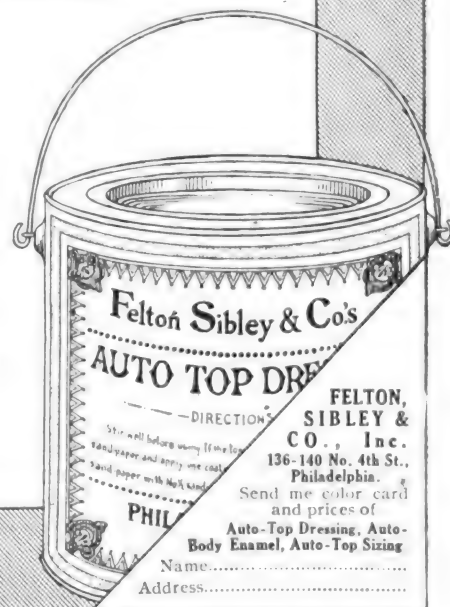


"F-S" Auto-Top Sizing

to be laid on before using the "F-S" Auto-Top Dressing, if your automobile top has never before been painted.

"F-S" Auto-Body Enamel

for the automobile body, in colors to correspond with those of the "F-S" Auto-Top Dressing. Special shades to order.



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Keystone Tire & Rubber Co.

Every Tire Guaranteed for 3000 Miles

We have decided to open the Season by supplying the Consumer at Dealers' Prices with our

1912 GUARANTEED TIRES AND TUBES

Main Office and Salesrooms,
1732-1734 Broadway, NEW YORK

Buy Direct from the
Manufacturer and Save the
Dealers' Profit.

FORMER PRICES			REDUCED PRICES		
Sizes		Tubes	Sizes	Clinchers	Straight Side & Anti-Skids
28x3	\$14.50	\$3.40	28x3	\$ 9.80	\$10.75
30x3	15.50	3.65	30x3	10.30	11.60
32x3	16.60	3.80	32x3	10.65	
30x3 1/2	22.85	4.95	30x3 1/2	15.05	16.55
31x3 1/2	23.70	5.05	31x3 1/2	15.30	16.80
32x3 1/2	24.40	5.20	32x3 1/2	15.80	16.90
34x3 1/2	26.55	5.55	34x3 1/2	16.55	17.55
36x3 1/2	27.00	5.80	36x3 1/2	16.70	
30x4	32.80	6.40	30x4	20.10	21.00
31x4	34.10	6.60	31x4	20.70	21.80
32x4	35.30	6.75	32x4	21.55	23.00
33x4	36.55	6.95	33x4	22.80	24.00
34x4	37.75	7.15	34x4	24.10	25.80
35x4	38.95	7.30	35x4	24.45	26.00
36x4	40.25	7.50	36x4	24.80	26.30
34x4 1/2	47.85	8.85	34x4 1/2	27.55	29.00
35x4 1/2	49.80	9.05	35x4 1/2	28.30	30.00
36x4 1/2	50.75	9.80	36x4 1/2	28.70	31.30
37x4 1/2	52.15	9.60	37x4 1/2	29.55	31.80
35x5	60.65	10.70	35x5	31.10	33.30
36x5	62.80	10.90	36x5	32.45	34.80
37x5	64.00	11.30	37x5	33.70	35.90

In ordering state whether Clinchers, Quick detachable Clinchers or Straight Side Dunlop

KEYSTONE TIRE & RUBBER CO. 1732-1734 BROADWAY NEW YORK CITY

We pay transportation charges on all orders accompanied by Check or money order East of the Mississippi.
No goods sent C. O. D. unless order is accompanied by 10 per cent of the amount of purchase.

References: Sherman National Bank, New York City, R. G. Dun & Bradstreets.

PUBLIC ARE DEMANDING UNGUARANTEED TIRES "GRIFFITH'S IMPROVED" — AND — "INDEPENDENT" TIRES SOLD AT 40% OFF

Are casings which are giving universal satisfaction for such a demand.

Have the good points of all other makes incorporated in them.
We are using a much heavier fabric and an extra layer more than the other Standard manufacturers.

CLINCHERS, DUNLOPS and Q. D. CLINCHERS.

Size	Our Unguaranteed	Our Guaranteed	Standard List
28 x 3	\$10.87	\$13.85	\$14.50
30 x 3	12.23	15.15	15.50
30 x 3 1/2	16.31	21.75	22.85
32 x 3 1/2	18.33	23.10	24.40
34 x 3 1/2	19.70	26.27	26.55
30 x 4	20.38	27.13	32.80
32 x 4	21.74	28.98	35.30
34 x 4	23.77	31.69	37.75
36 x 4	24.71	32.94	40.25
34 x 4 1/2	29.00	38.66	47.85
36 x 4 1/2	30.67	40.90	50.75
36 x 5	34.67	46.23	62.80
37 x 5	35.36	47.14	64.00

WRITE FOR PRICES OF OTHER SIZES.

Tubes.

"Independent" 30% off. Job lots of Standard makes at 40% to 60% off. Q. D. flaps \$1.00 extra. Goods shipped with privilege of examination. Money refunded on goods returned intact within a week.

AUTOMOBILE TIRE CO., Inc.

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HORSEY

THAT'S THE NAME

ONE
MINUTE
REPAIR

USE
GASOLINE
ONLY



No Cement

No Acid

Inner Tube Patch

One trial of Horsey No Cement Patches and you will consign Cement and Acid Repair methods to the scrap heap and be dollars ahead by doing it.

Large Kit, box contains 12 assorted (large and small) patches, **\$1.00**.

Small Kit, box contains 8 assorted (small) patches, **50 cents**.

Manufactured exclusively by

The Horsey Manufacturing Co.

5606 Euclid Ave., Cleveland, O.

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That Tire Question

Would soon cease to be so annoying, once you make yourself acquainted with the **Triple Tread** method of eliminating your punctures, preventing your car from skidding, and doubling your tire mileage.



"BEFORE"

The strength and resilience of a tire is in its heavy fabric carcass. Rubber treads are only to furnish a wearing surface to protect this carcass, and to keep out its greatest enemy—water.

Chrome leather, reinforced by steel studs, is the only thing tough enough, water proof and pliable enough to make a better and more economical tire tread than rubber. Chrome leather is ten times tougher than rubber, and water proof.

Three plies of this leather, brought down over the bead of the case so as to prevent rim cutting, and to protect against rut wear—three to six rows of hardened steel studs to give traction and prevent skidding—all this securely **vulcanized** to your casing (old or new) to keep out water and dirt—goes to make up the highest grade of tire efficiency.

The secret of Triple Tread Success lies in the fact that the Triple Tread affords perfect protection to the fabric carcass and positively keeps out all water, which causes rotting. Rubber treads cannot do this—detachable rubber or leather treads cannot do it—inside linings cannot do it. **Nothing but chrome leather, vulcanized to your tires in the Triple Tread way, can do it.**

PUNCTURE PROOF SKID PROOF GUARANTEED

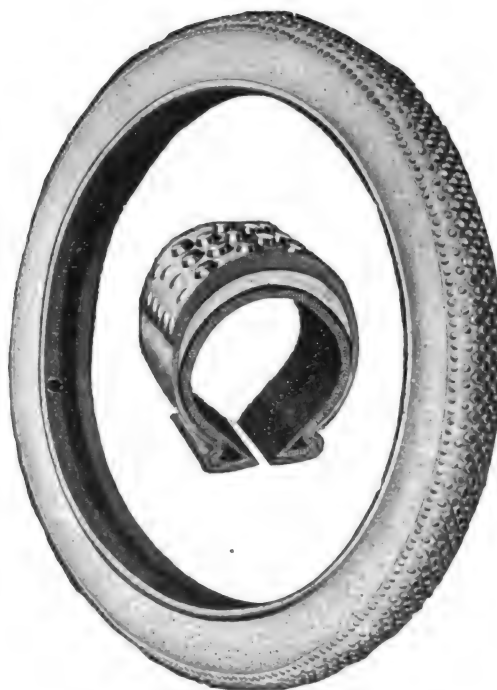
Let us Triple Tread just one of your tires now for a trial. The best time to act is while your car is laid up for the winter. Don't wait till you are ready to take the car out in the Spring.

**Write our nearest factory for full particulars and prices.
EVERY TRIPLE TREAD GUARANTEED FOR 3500 MILES.**

Name

Address

Make of car..... Size of tires.....



"AFTER"

Triple Tread Manufacturing Co.

CHICAGO

1542 Michigan Avenue

SAN FRANCISCO

542 Van Ness Avenue

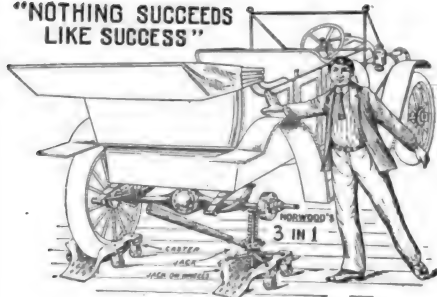
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NORWOOD'S 3 IN 1

"NOTHING SUCCEEDS
LIKE SUCCESS"



CASTER or portable turn-table, **JACK**, and **JACK-ON-WHEELS**

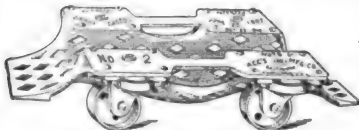
ANSWERS THREE PURPOSES.

A set of casters is a necessity in every garage, shop and factory.

You must have a Jack.

You cannot afford to be without a Jack-on-Wheels.

The Best, Simplest, Lightest, Smallest and Most Satisfactory Device for Handling Automobiles, Trucks, Etc., That Has Ever Been Introduced.

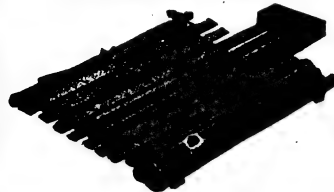


Licensed Under Weber Patent.
Patented June 25, 1907—Oct. 25, 1910

BECAUSE—They are better designed. Mechanically correct. Frame one solid piece of Malleable Iron. Cars can be run on or off either end. Ball-Bearing Casters with large wheels respond with less effort.

Write for our 30 day Free Trial Offer.

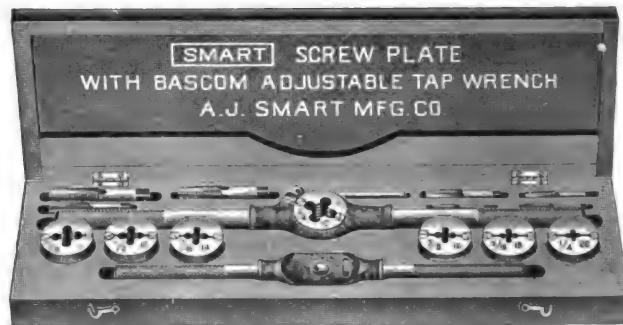
IDEAL AUTO TRAY



Thirty-seven inches long,
23 inches in width,
8 inches from floor, on 4
Roller Bearing Casters.

DISCOUNT TO THE TRADE.

AUTOMOBILE & ACCESSORIES MFG. CO.
BALTIMORE, MD.



WHY DON'T YOU OWN A

SMART

Screw Plate No. 4A?

CUTS $\frac{1}{4}$ -28, $\frac{5}{16}$ -24, $\frac{3}{8}$ -24, $\frac{7}{16}$ -20,
 $\frac{1}{2}$ -20, $\frac{5}{8}$ -18, $\frac{3}{4}$ -16 A. L. A. M. ST'D.

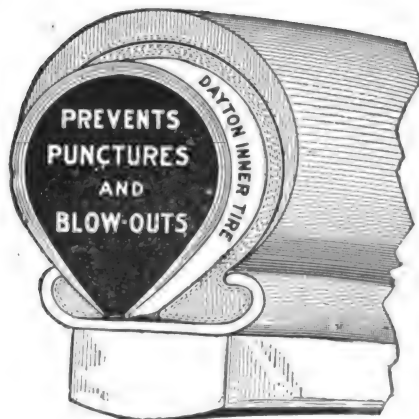
WRITE FOR SPECIAL CASH PRICE

—ALSO—

SEND FOR CATALOG SHOWING
OTHER ASSORTMENTS

A. J. Smart Manufacturing Co.
Greenfield, Mass.

TIRE TROUBLE STOPPED



Wear the tread completely off your tires by using the

Dayton Inner Tires

ABSOLUTELY prevents BLOW-OUTS and 90% of PUNCTURES.

Prevents tube pinches from fabric breaks.

Easily inserted and can be changed from OLD to NEW casings.

Write (Right now) for Descriptive Catalog.

AGENTS WANTED.

Dayton Inner Tire & Mfg. Co.,
DAYTON, OHIO, 19 Madison.

A NEW TIRE FOR \$1.25



By looking over your tires once a week and filling up those curb cuts which are left unprotected so that sand—and water—cannot work through the opening, loosen the tread and rot the fabric—causing blowouts.

Cement Doh prevents all this, and saves the cost of a new tire.

Cement Doh makes all kinds of repairs, such as:

**"It's Tough and Elastic"
and "Stays Put"**

Repairs punctures in tubes.
" casings where the carcass is exposed.
" cuts in casings
" sand pockets.
" blowouts.

For the Cement-Doh Outfit contains one large Blowout Patch, 1 can Doh, 1 can of M. & M. Cement, emery cloth for cleaning, brushes and complete directions.

Repairs will be permanent and you can do it quicker and better than vulcanizing. No heat required—no possible chance of burning your tube or casing.

Ask any Tire Manufacturer if the Cement-Doh process isn't recommended by them.

COMPLETE OUTFIT, \$1.25

Not \$2.00 nor \$2.50.

Sold by all dealers and jobbers or sent direct express prepaid.

THE M. & M. MFG. CO., Akron, Ohio.

Manufacturers of that famous M. & M. Cement—all goods sold on the money back plan.

A POSTAL WILL BRING OUR NEW CATALOGUE.

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The 400 Steel Blower will serve the youngest mechanic faithfully without expense for a long lifetime.

Crank turns either way.



The Famous 400 Champion Steel Blower.

The incomparable 400 Blower, the one greatest Heirloom that will be handed down from one Generation to the other. Ask what the owners say.

Over one-half million 400 Champion Steel Blowers and Steel Forges in use. Forever in easy, smooth and noiseless.

The No. 400 Champion "Whirlwind" Blast Anti-Clinker Heavy Nest Tuyere Iron is furnished with all 400 Blowers without extra cost.



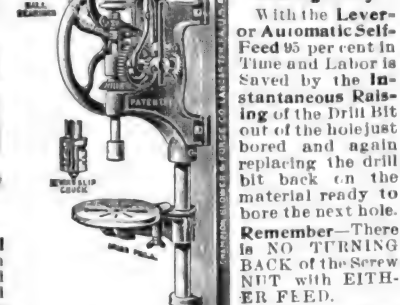
No. 408 Steel Blacksmith's Forge

Before purchasing a Hand Blower, Forge Drill Press, Tire Bender, Tire Shrinker, Screw Plate, Power Blower or Electric Blower, write for our free catalogue, which always shows the greatest variety of improved blacksmith tools built under one control in the world.



No. 401 Steel Rivet Forge

Champion "Patented" Automatic Self-Feed and Lever-Feed Upright Post Drills. Made with Ball Bearings only.

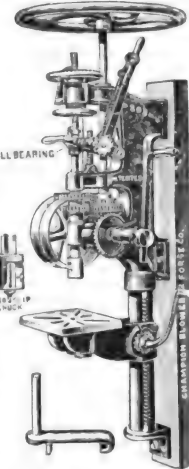


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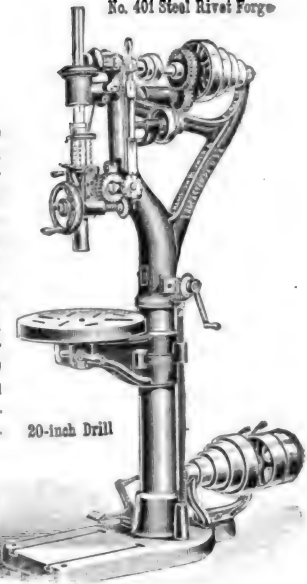
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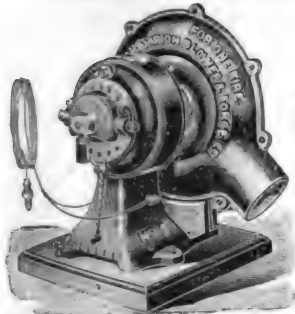


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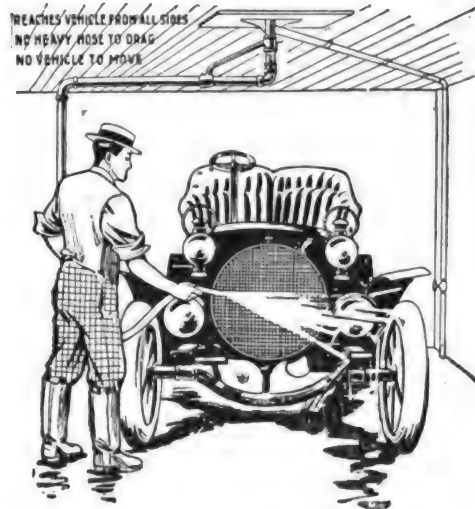


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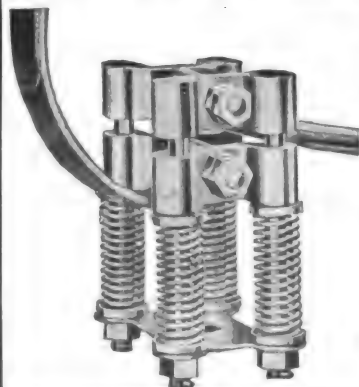


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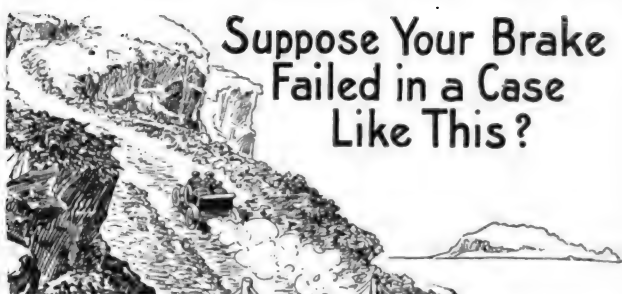


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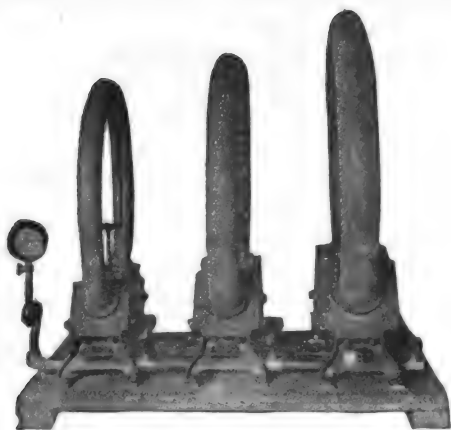
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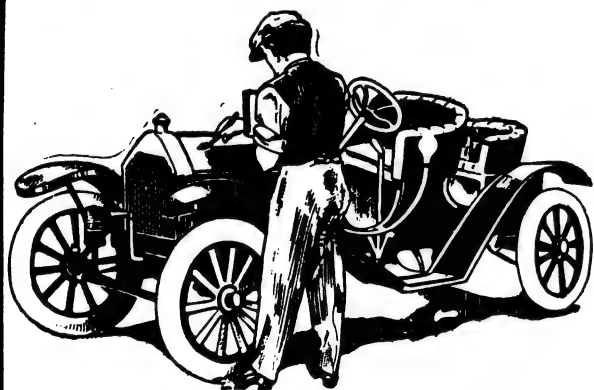
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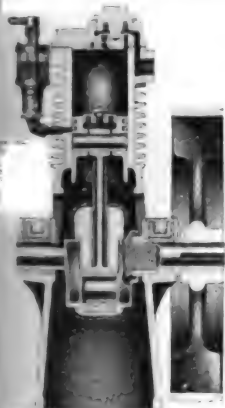
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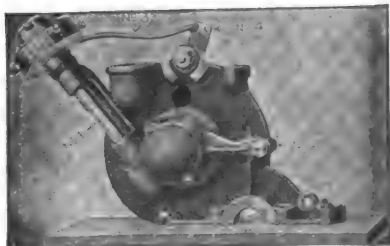
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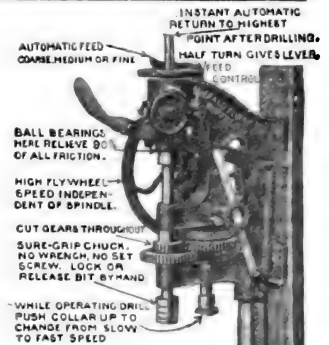
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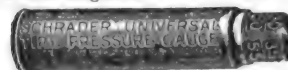
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He insists that this is tire economy and
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VOL. XIII, No. 1.

NEW YORK, MARCH, 1912.

SLIDE AND POPPET VALVES.

Their Development From the Beginning and Comparative Merits.

BY SIDNEY F. WALKER.

It is exceedingly interesting, to anyone who studies the development and progress of any branch of engineering, as the present writer has automobile engineering, to watch the struggles between the different forms of apparatus, of parts of the engines or gearing designed to perform different parts of the work, and to note the

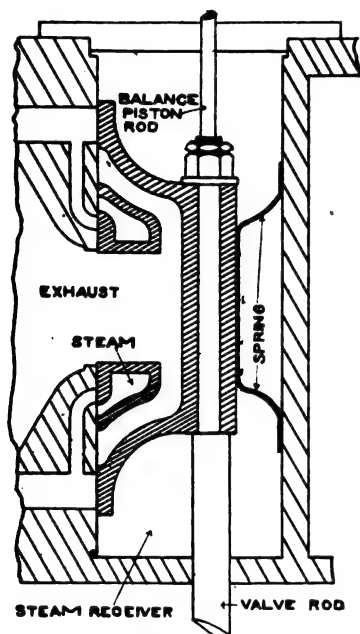


Fig. 1.—Sectional Diagram of Steam Slide Valve, with Arrangement for Balancing the Weight of the Valve.

striking similarity between those struggles, and the corresponding struggles which took place in the developments of earlier apparatus. The slide valve and the poppet valve are well known in steam engineering work. It was the slide valve which was claimed to have solved the problem of the distribution of steam to the alternate ends of the piston, and the discharge of the steam when it had done its work. The slide valve reigned supreme in steam engineering for a very long time. Latterly, however, it has fallen somewhat into disgrace for steam engines, though there are still a large number who prefer it to the other forms which have taken its place. It has been displaced by what is known as the piston valve, the trip valve and the Corliss valve.

Figs. 1, 2, 3, 4, and 5 show, diagrammatically, the arrangement of the slide valve, the piston valve, the trip valve and the Corliss valve for steam engines. It will be noticed that the trip valve is almost the same as the poppet valve of the automobile gasoline engine; while the piston valve is a very close approach to the modern slide valve of the motor car engine, and the Corliss valve

illustrates another valve motion that is being borrowed in modern gasoline engines. In the very early days of the gas engine, from which of course the gasoline engine was developed, a slide valve, which is shown in Figs. 6, 7, and 8, was employed. The gas engine slide valve again fell into disgrace, from various causes detailed below, and was replaced by the poppet valve. The writer remembers very distinctly the triumph with which the makers of a new form of gas engine, in which the poppet valve was employed for the first time, pointed to the results they had obtained with it.

In the steam slide valve, as will be easily understood from the drawings, the distribution of the steam was accomplished by allowing it to enter behind the moving plate forming the valve, and to pass through ports in the valve itself, and in the cylinder walls, which were opened at the proper time. When steam was to be admitted behind the piston at one end, for instance, the port in the slide valve, and the port in the cylinder wall behind the piston at that time, were opposite each other, the steam having a more or less free passage through into the cylinder. The slide valve was moved along the

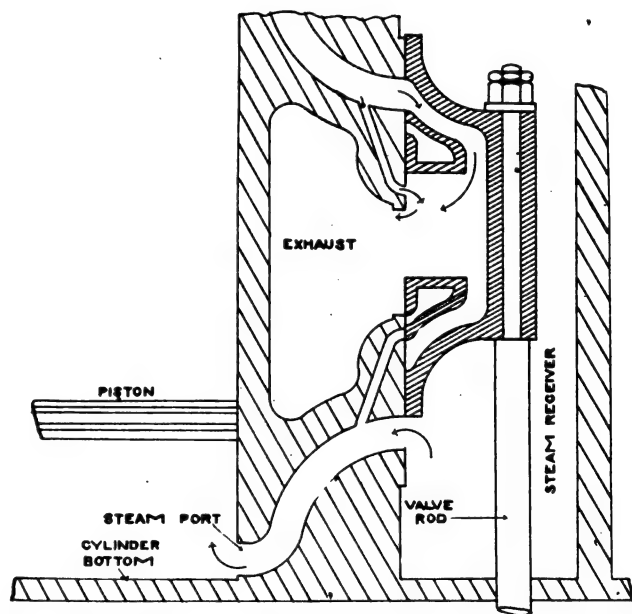


Fig. 2.—Another View of the Slide Valve shown in Fig. 1. Entry Port on One Side of the Piston Shown Open.

planed surface of the cylinder wall, by a rod from the crank shaft, worked by an eccentric. As the slide moved, it gradually closed the steam passages, the planed surface of the valve coming opposite the port in the cylinder wall, as shown in Fig. 2, and the port in the slide coming opposite a planed surface in the cylinder wall. Various modifications were introduced into the arrangement of the slide valve, intended to control the time of admission of steam to the cylinder. What was known in those days as "lap" and "lead" were given to the slide; the meaning being that in the one case the ports were open

rather longer, owing to the slide overlapping the planed portion of the cylinder wall, and in the other case the steam entering the cylinder a little earlier, and its admission being cut off a little earlier. In the later days of the slide valve, also, the time during which the port in the valve and in the cylinder walls were exposed to each other, was controlled by special gear worked by the governor. As soon as economy in steam commenced to be studied—when the price of coal commenced to rise, and when competition became so keen that every source

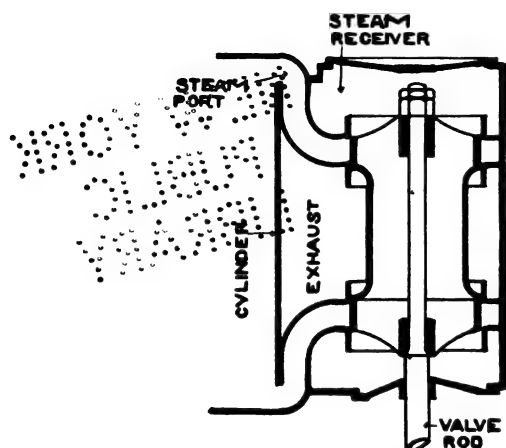


Fig. 3.—Sectional Diagram of Piston Form of Steam Slide Valve.

of economy was obliged to be studied, the cost of power amongst others—it was found that economy in steam was obtained by cutting off its entry at a varying portion of the stroke, and allowing the remaining portion of the work during the stroke to be performed by the expansion of steam. In the gas and gasoline engines, it will be recognized, practically the same arrangement rules, though the variation of the cut-off has not been so fully worked out as in the case of the steam engine. In the

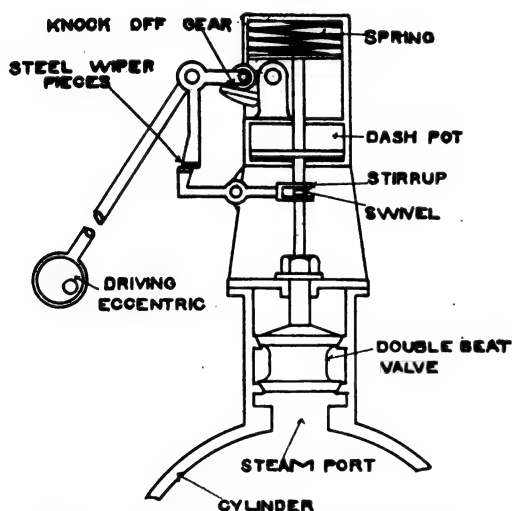


Fig. 4.—Sectional Diagram of Steam Trip Valve.

gas and gasoline engine, it will be remembered that the actual combustion only occupies a small portion of the explosion stroke; the remainder of the stroke is performed by the expanding force of the heated gases; the expansion being caused of course by the heat liberated during the combustion of the charge.

With the steam engine, it was found possible, and particularly as steam pressures increased, to do the same work with a $\frac{1}{2}$, a $\frac{1}{4}$, or even at the present day with a

$\frac{1}{20}$ of a cylinder full of steam, that had previously required a whole cylinder full. The slide valve was made to carry out this arrangement, by being moved more or less rapidly along its path. It will be understood that the face of the slide valve which moved along the face of the cylinder was carefully machined, and the side of the cylinder wall along which the slides moved was also carefully machined. It was a necessity of the case that they should be a true fit. One of the complaints made against the slide valve in later years was, leakage of steam owing to wearing of the two opposed faces. It will easily be seen that as the two ports communicating with the steam chest, and the exhaust port communicating with the exhaust pipe, were necessarily very close together, if any space existed between the two opposing faces, that of the slide valve, and that of the side of the cylinder opposed to it, steam leaked across from the steam ports to the exhaust ports, in a fairly continuous stream, the leakage steam being absolutely wasted, but having to be made up by other steam, generated in the boiler that was supplying the engine.

The experience of the early days of the slide valve in the gas engine was exceedingly interesting, inasmuch as it reproduced in a very much accentuated form, the difficulties which had been experienced by steam engineers

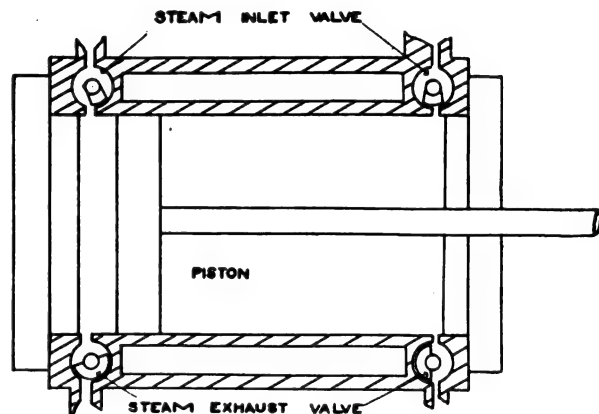


Fig. 5.—Showing a Section of a Steam Cylinder Worked by Corliss Valves. The Valves Rotate and Allow Steam to Pass through the Passages that they Open or Prevent its Passage.

from leakage. In the slide valve, employed in the gas engine, as will be seen from Figs. 6, 7, and 8, there were ports in the moving slides, and in the cylinder wall usually at the back end of the cylinder; and when the ports coincided, so that the gas and air had a free passage into the cylinder, a charge was sucked in. In practice, it was found that the slightest amount of wear, the smallest amount of dirt, upon either of the faces of the slide valve was sufficient not merely to cause leakage and waste of gas, the equivalent of the trouble with the steam engine, but to prevent the engine working. The usual method of ignition with those engines was, by a gas flame, placed in a convenient position, which was exposed to the charge, by means of other ports that were opened, opposite each other, at the commencement of the explosion stroke, as shown in Fig. 7. One could never be certain in those days whether it was the flame that was not quite the right size, or whether it was the gas that was leaking past and not finding its way into the engine; all that one knew was, the engine would not work; and the only remedy for the trouble was, to remove the slide, and to replace it by the other which was always kept ready.

The spare slide was immediately cleaned up, and cleaning meant a very careful work, indeed. It meant

scraping the surfaces opposed to each other, removing every particle of dirt, every indentation, and getting two surfaces as nearly perfect as possible. In those days, as with motor car engines of the present day, trouble often arose from bad lubricants. Again and again the user of a gas engine would be implored by the representative of some oil firm to try his particular brand of oil. After a few of such trials, the user of the gas engine got too wary. He found, by painful experience, that only a certain class of lubricating oil would keep things going; and if he was wise, he stuck to that oil.

Users and repairers of motor cars will recognize the same trouble in another form at the present day. It was

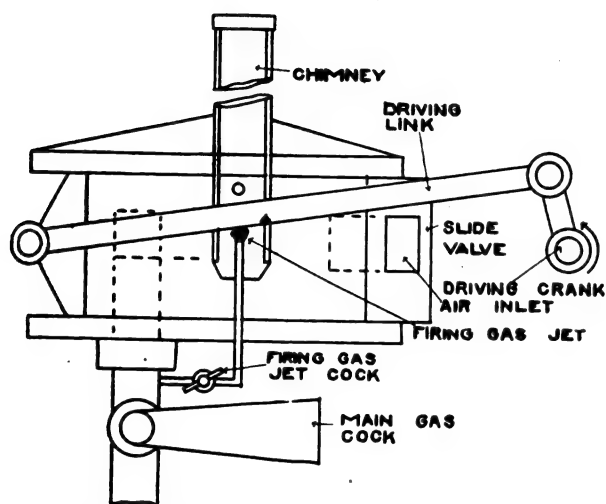


Fig. 6.—Diagram of Early Form of Gas Engine Slide Valve.

necessary, in order that the slides should work freely on one another, that they should be bathed in oil. Practically they ran in an oil bath. If the oil had the slightest tendency to carbonize, carbon was deposited, first in the ports, and then upon the opposed faces of the slides, and the engine soon broke down.

One important comment may be made here: Mechanical work in the early days of the gas engine was very different to the mechanical work of today. The machine tool work of today and the fitting of today are very different things from the fitting of 30 years ago, the period the writer refers to. In those days the ordinary mechanic thought he had done remarkably good work, if he fitted to 1/16 in.; today fitting to 1/1,000 in. is not only common, but practically the rule.

Notwithstanding, however, the enormous improvement in machine tools and in fitting generally, the introduction of the slide valve into motor car work, though the arrangement is quite different from the slide valve of the early gas engines, appears to the writer to be exposed to the same possibilities of trouble that were met with in the steam slide valve and the slide valve of the early gas engine. With the most careful fitting, the most careful handling, and the most careful lubrication, in every sense of the term, wear is bound to take place; and when once wear commences, the mere passage of the gas and air through the worn parts tends to increase the wear, and trouble sooner or later must result. It appears to the writer, also, that it will be somewhat difficult to maintain the proper contact between the piston and the cylinder walls, to ensure the due closing of the valves when they should be closed, and their opening at the proper time. This is the trouble with all valves of that kind. They are very good, indeed, so long as wear does not take place, or is very small; but immediately wear commences, trouble is not far off. Further,

the number of owners of cars, and the number of drivers of cars, who are sufficiently careful of the machine that is under their hands, to give the slide valve the really fair chance it wants, is probably very small, indeed. The average owner of a car naturally thinks that nothing ought ever to go wrong. In too many cases, the owner, particularly if it is a woman who drives herself, is very apt to go on the lines that may be expressed as "letting her rip." In the columns of a daily paper in England, a few weeks ago, there was an article upon "The Gasoline Woman." The writer of the article described with great admiration the woman who had thoroughly mastered all the intricacies of the motor car engine and accessories, and was proud to be able to do everything herself, not minding having greasy hands, and so on. He also, however, described another kind of Gasoline Woman. He said that he was standing in a repairing garage when a heavily powered car driven by a woman came in full pelt, and stopped dead within two inches of the end wall of the building; she threw herself out of the car, not stopping to shut down the engine, and instructed the owner of the garage to put things right for her by the time she wanted it again. It was not surprising perhaps that the owner of the garage rubbed his hands gleefully, having a very heavy repairing job on hand, one for which a considerable amount would be paid, nor at his remark, that he had jobs of that kind from that lady about every month. Probably the mechanic employed by the lady, if she had one, would follow his mistress' lead, and would also "let things rip." With such an *entourage*, the present writer, if he were ad-

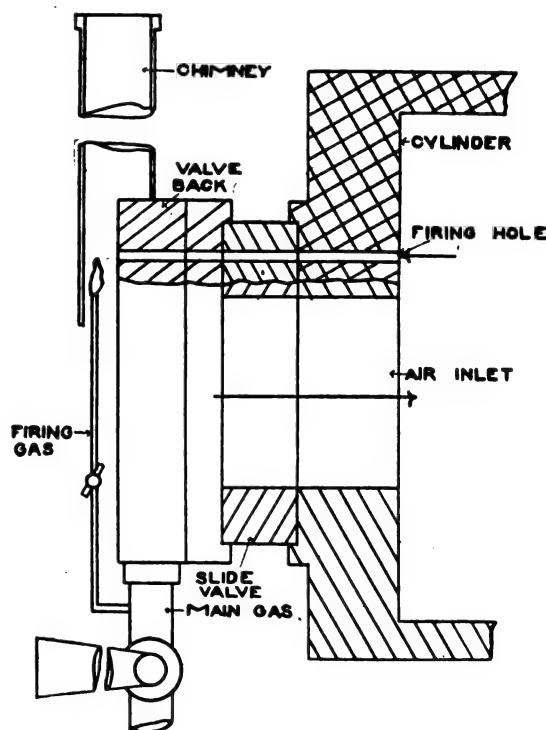


Fig. 7.—Another Form of Early Gas Engine Slide Valve.

vising, would say, give me the old poppet; never mind the noise, it will keep going with a little grinding, it may not be possible to keep the slide engine going, without continually renewing the piston. Of course, where expense is of absolutely no consideration, the renewal of a piston at frequent intervals does not matter; but in the writer's experience, sales of that kind are not really good for the maker, nor for anyone else; hardly even for those who are running repair shops.

Folks get to know the big bill that the car runs up,

and after making every allowance for the owner of the car, and her general disposition to "let things rip," there is an unavoidable tendency to buy a car somewhere else, if there is somewhere else not far off; and if the car supplied at the other place has been in careful hands, and has not run up a big bill. Though it is very sweet to have a car coming in month after month, and having a big bill for repairs, there is a tendency on the part of outsiders to think that the repairs cannot be very well done, or the car would not come so often to the shop.

(To be continued.)

ADJUSTING THE TIMER.

Instructions in Plain Words for Dismantling and Assembling the Motor.

From O. H. Hampton, Indiana.—Your reply to the inquiry of Mr. George L. Dingman (No. 775) in the February number, is all plain and lucid enough to those who are familiar with motors, but rather too technical for the amateur who has "torn things up" for the first time, which may or may not be the case with Mr. Dingman. It occurs to the writer that a description in plain words of what is to be done in dismantling and re-assembling a motor, may help some poor fellow who has got stuck in doing it.

Having decided to take the motor apart, the first thing is to take out the spark plugs, turn on the current and crank the motor slowly, so as to observe the order or succession of the firing of the cylinders. The spark plugs are of course to be placed in such positions as they would be if the object was merely to test the plugs by making them spark. As each plug sparks, note which one of the vibrators is vibrating, and mark it and the cylinder to which it sends current, with the same mark, so if the wire leading to the cylinder be removed, the connection can be made just as it was. It does not matter about the same wire or the same plug being used in the same place when again putting the work together. It is merely a matter of getting the vibrator and cylinder properly connected.

If these connections are made as they were before, there will be no need to look there for trouble if the motor does not work right after re-assembling. If other wires have to be detached, note and remember what the connections are so as to replace them the same as they were. If the timer is to be removed, take off the cap or plate so the interior can be seen, and make a mark on both timer and cam shaft that will show how it is to be replaced on the shaft. It is also necessary to mark each contact with reference to the cylinder that particular contact operates. Turn the crank until No. 1 cylinder is sparking.

There are three points to be noted for each cylinder: the cylinder, the vibrator, and the timer contact, and these points are to be marked or remembered for each cylinder. If these points are not marked or remembered, there is going to be more or less (generally more) trouble for the beginner.

The next and most important thing is the removal of the cam shaft. It must be replaced with the same gears in mesh as they were before. A difference of two or three gears will put everything wrong, for these gear wheels control and operate the valves, both intake and exhaust. If they are not put in right, the whole motor will have to be taken down again to get at them.

Nearly, if not all, gear wheels are marked so there need to be no trouble in getting them together right.

Turn the motor over slowly and watch for the marks. They are generally marked by a chisel cut or other mark on each side of a certain tooth in one of the wheels. The other wheel is marked by a single chisel cut from the bottom of the groove between two of the teeth, extending toward the center of the wheel. The tooth having a mark on each side is to go into the groove that is marked on the other wheel. There are certain marks on the rim of most fly-wheels for determining these things, but they are mostly too complicated for the inexperienced amateur to readily understand.

It is important that every piece that is removed should have its position noted and remembered, so it can be put back in the proper place again. If the old timer is to be replaced by a new one, it is best to replace it by one of the same pattern, provided of course that the old one was satisfactory, as it is less trouble to set it than it might be to set one of an unfamiliar style. To properly set a new one on the cam shaft, slip it on the shaft, but do not tighten the set screws. Leave the spark plugs out and the priming cups open on all but No. 1 cylinder. Crank the motor slowly until you can feel the resistance of the compression in the cylinder. Now take the priming cup out of the cylinder head and put a lead pencil or a stick in the priming cup opening in the cylinder, until you can feel that the piston is at the highest point. Leave it there and lay the plug for No. 1 cylinder on the cylinder, with only the threaded part of the plug touching the cylinder. Attach the wire that goes with No. 1 vibrator to any one of the contact binding posts on the timer. Now turn the timer on the shaft until there is a spark at the plug. The timer is now in proper position to be fastened on the shaft, provided it is also in proper position with reference to the short lever or arm by which the rod from the spark lever is attached to the timer. If this is not in the proper place, release the wire from the timer, and turn the timer until the arm on the timer is in place with reference to the rod. Then attach the wire to the binding post which is nearest to the position it occupied on the old timer. Adjust the timer by turning forward or backward till the plug sparks. Then tighten the set screws, and connect the rest of the wires as they were connected on the old timer.

In case the timer should slip on the shaft, as it does sometimes, it can be re-set in the same way, but it is much better to mark it by corresponding marks on the timer and shaft, as it is only necessary then to bring the marks in line and tighten the set screws. Center punch marks are all right for marking where there is but one place to be marked, but where there are a number of parts to be marked in pairs or a greater number, small steel stencils for marking duplicate numbers are very convenient.

These things are all of them "old stuff" to a lot of us who have been in the auto game for years, and it is not written in the expectation that it will be anything new to them, but hundreds of new hands are coming into the business every day, and they have everything to learn.

Hose Connections.

If rubber hose connections are used anywhere in the water circulating system, they had best be renewed at the beginning of each season, as they deteriorate rapidly, and sometimes the inside layer of fabric separates from the rest and impedes the circulation without the defect being apparent from the outside. No kinks should be allowed in such connections, and the clamp fasteners should be properly secured.

MORE GARAGE TURNTABLES.

Something Simple, Practical, Easily Made and Easily Handled.

BY JAMES F. HOBART, M. E.

Mr. C. D. Oldknow, Pennsylvania, writes under date of December 14, that "since reading your able and practical article on garage construction in the November, 1911, *Automobile Dealer and Repairer*, I wish to suggest that you give us an article in the near future, on a cheap, practical turntable designed to work in a garage without a basement.

"I have a Ford, Model T, and while I very much desire a turntable, still the Ford is so easily handled that I am not justified in spending either time or cash on a table requiring a basement. I might add that as chief engineer of a large coal company, I can appreciate as a mechanic a practical treatise. Your article is admirable, but in my case I cannot use it. I have studied a great deal over a suitable table, made cheaply, but thus far have not been able to scheme out just the thing desired.

"I have made a truck, with revolving casters, as

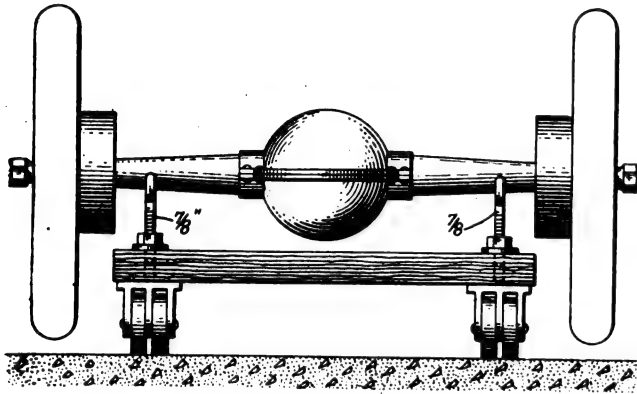


Fig. 1.—Turntable Truck.

shown by Fig. 1, to stand under the car which is to be raised from the floor by means of screw-jacks, one in each corner of the truck. This arrangement is effective, but it is too much trouble. It is easier to back the car out. The garage door is just high enough to admit the car with the top up, otherwise, I could arrange to run the car on top of such a truck; but door height will not permit—neither can I make the door higher on account of the roof.

"I have decided to cut out a circular hole in the floor of the garage and excavate sufficiently to lay a concrete wall or floor which will guide the rollers which

not reduce the friction, it would place the friction upon a smaller area which could be well lubricated and cause the table to turn easier.

"I have not yet given up the idea of raising the car from the floor to turn it, because of the many advantages of having the wheels jacked up and free to turn, but it is very slow work jacking up the car and lowering it down again. In my derrick I pivoted the center of the truck to the floor, but I found that on a wooden floor, the casters cut into the floor and made

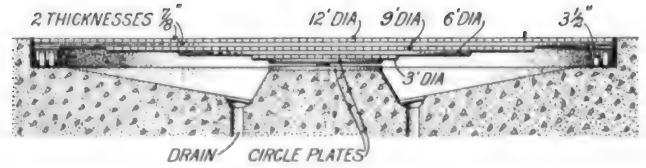


Fig. 2.—Caster-supported Turntable.

it very hard to turn the truck. This is no objection, however, as thin metal plates could be fastened to the floor for the wheels to run on, a hardwood floor laid, or a concrete floor provided underneath the wheels or casters.

"It will be noted in Fig. 1 that a $\frac{7}{8}$ -inch screw passes through a hole in the truck frame and carries a nut. Turning the nut upon each of the four screws, raises the car. Having small children. I wanted jacks which were safe and could not be jarred loose and drop the car, hence the screws and nuts. A quick-acting device would make this truck a practical turntable, but it should have casters at least six inches in diameter with three-inch face. I won't look for a personal reply to this letter, but will patiently wait until you tell us all in the *Repairer and Dealer*, how to make a good table without the necessity for a basement. Give us a pitless turntable.

[Signed] "C. D. Oldknow."

The ideas set forth by Mr. Oldknow in the above letter are very good as far as they go, but, as the gentleman states, they should be carried a little farther and to that effect, the following suggestions are made:

To render the truck quick-acting, suggest that the form shown by Fig. 3 be substituted for the one shown by Fig. 1, or rather that the nuts upon the $\frac{7}{8}$ -inch screws be made in the form of sprockets instead of plain nuts. This scheme is shown by Fig. 3. An automobile chain is to be placed around all four of the gear-nuts so that moving one of them will turn all. A ratchet wrench is shown attached to one of the gear-nuts, and by means of this wrench, the screws

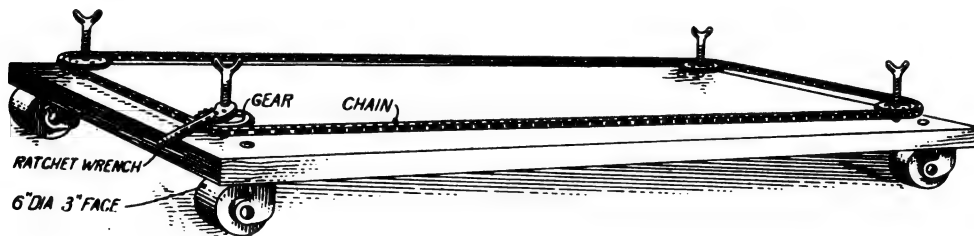


Fig. 3.—Quick Operating Truck.

carry the table. I shall of course fix the casters stationary so they won't revolve, Fig. 2 will illustrate this scheme. Having eight casters, they could be spaced to support the table at eight points in the circumference or about every $4\frac{1}{2}$ feet in a twelve-foot table.

"The wood-work can be in twelve, nine, six, and three-foot circles. I would arrange to put the weight of the car upon the center bearing and thereby take most of the weight off the casters. While this would

may be worked up or down; all together, and in very quick time.

A false floor must be placed above the chain, shown in Fig. 3, so that the chain will be out of the way of the automobile wheels when the car is passing on or off the truck. The matter of fastening the truck wheels so they cannot turn, it seems to the writer, should not be done. It appears as better to let the caster wheels trail along so that they may always be automatically in

line—something which does not always happen when the wheels are fast to a truck, even when the truck is pivoted in the center and can only travel around and around instead of straight ahead in some direction or another.

Regarding the caster supported turntable, shown by Fig. 2, it looks as if the device were a good one, but should be modified in a few particulars. For instance, the wheels are shown resting and presumably to be operated upon a surface of concrete. This arrangement will not be found at all satisfactory and the wheels or casters should be placed upon metal, either cast or wrought iron or steel. Concrete may be made smooth and level enough for the casters to run on; but it is very doubtful indeed that the average mason can do that trick, and it is ten to one that the casters will disintegrate the concrete surface and wear it full of holes. By all means, place metal between the casters and the concrete surface. Another place where trouble will be met with is in the center bearing. If some steel balls be placed between the circle plates, then the table can be revolved fairly easily, but if the attempt be made to run the table upon a pivot or a step bearing then the trouble-bird will flop down upon the turntable pretty often.

It would seem much better to the writer, to let the wheels carry all the load and then the center-bearing would be merely a pin to hold the turntable in place. Such being the case, a form of construction could be used to advantage, as shown by Fig. 4. In this engraving, it may be seen that the center bearing is a mere



Fig. 4.—Ball-Bearing Turntable.

pin, working in a hole, and touching only upon the sides of the hole, thus merely keeping the turntable in place laterally and letting the rolling supports do all the load-carrying.

Fig. 4 represents a form of ball-bearing which is commonly used for loads of 3,000 to 8,000 pound turntables. Frequently the balls are just as they came from the foundry. In some turntables of this character, as they come from the maker, the balls resemble lemons more than they do balls, and the turntable moves pretty hard in consequence.

In the "store" turntable, the groove in which the balls run, is V-shaped and the bottom of the groove forms a resting place for thick oil and the metal which wears off of balls and ball race, for there will always be wear whenever the table is operated.

Some turntables are made with two grooves, one above the other, and the central bearing is then dispensed with. But for the home-made table, it is better to use a groove for the balls to travel in, a central lateral support for the table as shown by Fig. 4, and then use a flat plate underneath the floor of the table for the upper portion of each ball to bear against. If the upper plate be flat, instead of grooved, the ball race may be out of truth considerably, laterally, and still not affect the easy running of the table to any great extent. If both upper and lower ball plates or races are grooved, then both must be turned in a lathe and made truly cylindrical, otherwise it will require much power to revolve the table.

For the home-made turntable, the ball race may be made of channel iron bent into a circle as described for the basement turntable. The balls may be simply

placed in the channel and left to go as they please therein, some oil being put into the channel with the balls, which should be from four to six inches in diameter, and quite smooth and true spheres. The balls may be cored out and made quite light as they need not be more than one-fourth inch thick. They may be cast in an iron mold and thereby made to come out smooth and round without being turned or ground.

There is a type of turntable which may be developed for garage use which the writer has never seen used for that purpose, nor has even heard of its being suggested for that purpose. A turntable of this kind would require only barely pit enough to contain the floor of the table, say five or six inches in depth.

The table shall be made circular in shape, and supported by four rods or posts in a manner similar to which an elevator cage is supported. In fact, this kind of a turntable is an elevator platform and the four supports are to be framed or bolted into cross timbers or beams, high enough above the floor as not to interfere with the automobile top. Thus, the four posts may be framed into timbers or steel beams, or the posts may be bent inward and carried up past two thrust beams, until the posts meet and are fastened together and developed into an eye, through which a heavy rope, a chain, or a wire cable is passed, thence upward to be passed over a differential chain hoist, over the winding shaft of a bull-wheel, or to a simple turnbuckle by means of which the floor of the turntable is adjusted exactly even with the floor of the garage.

When the hoist or the bull-wheel is used, the middle of the turntable may be cut out, and the table, with a car mounted upon it, may be hoisted into the air several feet, thereby making the table do duty as a pit as well as a turntable. A swivle must be placed in the mechanism which supports the table. A plain swivle may be made to carry the table, but it will be much better to put in a ball-bearing swivle, for that mechanism will enable the table to be revolved much easier.

If care be taken to design the turntable large enough so that the automobile may be run upon the table far enough to balance the table, then the revolving of the table will be very easily done, indeed. If the diameter of the table must be kept down to a diameter which will barely allow the car to be contained by the table, then it will be necessary to place some rolling lateral guides around the turntable to prevent its tipping and binding against the sides of the hole in the garage floor in which the table is placed.

The table or floor shown on pages 45 and 46 of the November Automobile Dealer and Repairer may be used for the suspended turntable without any change except the fastening of four rods, chains, posts, or cables to the angle ring underneath the wooden surface of the table. For the ball-bearing table, the same construction cannot well be used as a center bearing is necessary, but with the larger ring replaced by a plain flat ring, the small ring bolted on underneath and the wooden floor carried clear across the table, the construction could be used for the ball-bearing arrangement, also.

A form of turntable can be easily arranged, which will permit the turning of the table, in one direction or the other to be accomplished by the engine power of the car. This may be arranged by mounting below the surface of the table four shafts in bearings, upon the ends of the parallel shafts are to be arranged pulleys just flush with the surface of the table and the right distance apart to fit the distance between the four wheels of the automobile. To operate the device, the car is run upon the table in the usual manner and

stopped when all four of the wheels bear fairly upon and between the underfloor pulleys upon the ends of the four shafts mentioned above. The front of the car, when the wheels are in position upon the pulleys, is made to bear against a jointed stop or buffer which is thrown into and out of position by a lever placed within reach of the automobile driver.

The shafts carrying the wheel-bearing pulleys are connected by gears to a bull-gear or a bull-wheel arranged underneath the turntable in such a manner that revolving the four shafts above mentioned will cause the turntable to revolve. Then, when the engine is made to turn the automobile wheels slowly, the pulleys and shafts in the floor are revolved and the turntable moves right around in either direction, accordingly as the gears happen to be arranged underneath. Two jointed stops or buffers will be required, one at either side of the turntable, but only one will be used at a time, but there must be four shafts arranged with pulleys at each end thereof in order to carry all four of the automobile wheels. A brake must be arranged—or a clamp—so as to lock the tread-wheels when it is required to run the automobile off the table, the locking to be done whenever the vehicle points in the right direction for going ahead.

It is very probable that the jointed stops can be dispensed with by placing the tread-wheels far enough apart that the automobile wheels cannot climb out of the cavity between those wheels until they have been locked or clamped.

A Lifting Jack.

From George H. Waltman, Pennsylvania.—The automobile jack should have a straight lift which is more rapid than a ratchet jack. It should lift at least two inches clear and lift at the axle and not at the hub of the wheel which does not allow the wheel to turn when the car is jacked up, and after the jack is let down it must lie ready and capable of lifting the same load a second and a third time and a continual number of times, and must not act as a set of jacks purchased from a noted supply house which were guaranteed to lift a load of two tons, and when put to the test under one end of the axle of a 3600 pound car, instead of lifting the car the handle had been bent around like a whip and the car was not lifted the fraction of an inch.

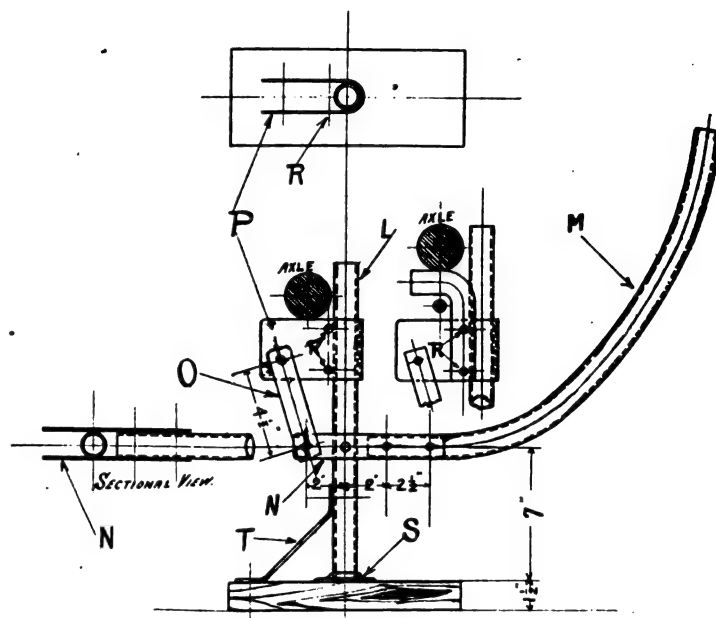
We therefore started from the bottom up to build our own, and we first procured a block of hard wood $1\frac{1}{2}$ inches thick and about 5×12 inches, rectangular shaped. A generous supply of second-hand one-inch pipe procured at a junk dealer's was cut into proper lengths which for the uprights L in the illustration required a piece about 17 inches and that for the handle M one about 24 inches, although these lengths can be lessened or increased to suit requirements and conditions. Two pieces of 3-16 flat iron and $1\frac{1}{4}$ inches wide by $7\frac{1}{2}$ inches long had holes drilled to accommodate machine bolts as indicated in the illustration. Two other pieces, O, of the same $1\frac{1}{4} \times 3-16$ flat iron, were cut six inches long and also drilled and riveted as indicated.

The sliding piece P is a U-shaped piece of $\frac{1}{8}$ inch flat sheet iron cut from any hand scrap, in this case about three inches wide and about 11 inches long and bent around the support L in a U-shape and held loosely in position by two light bolts R. The socket S is held rigid to the wood block by four wood screws, into which is tightly screwed the support L. A jack of this description has lifted with ease one end of a 3600 pound car clear two inches. How much more weight could be lifted has never been tried, as with

the given sizes and dimensions the jack showed no signs of weakness.

If a heavier weight is to be lifted, a very little added to the size given will greatly increase the lifting power. Curving the handle as shown permits of more leverage with less space than a straight one and if the space will not permit of a lever of this length when the jack is raised, a convenient alteration can be employed by simply slipping a piece of larger size pipe over the end of the handle and again removing when the jack is raised and the handle lowered.

Another alteration may be found wise and practi-



Sketch of the Jack.

cable is to add to the elevating sleeve P two pieces of flat iron bent and secured by the bolts R as shown in the small cut. This will accommodate itself to the rear axle on which is usually a brace rod underneath the differential gear case and will allow the weight of the car to come on the axle and not on the rod. When this is done the fulcrum for the handle M and N must be lowered and the support L can be shortened.

A still further addition is a brace T made of the same flat iron $3-16 \times 1\frac{1}{4}$ inches which will make the upright more rigid. $\frac{3}{8}$ or $7-16$ inch bolts had better be used throughout, excepting those which hold the piece N to the handle M and the two bolts R, which can be 5-16 inch, and the same size may be used to fasten the brace T, which might have two at each end instead of only one, as shown.

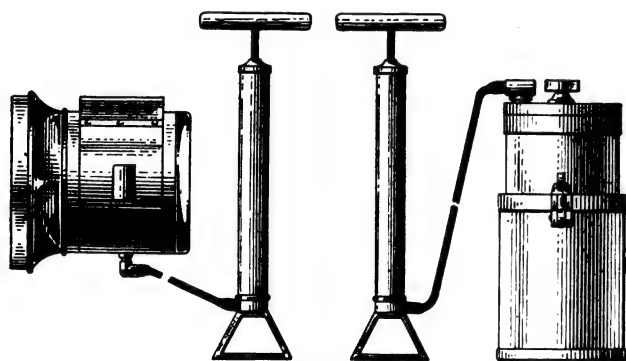
How To Use Nuts and Bolts.

Experience has shown that a good deal of trouble has been caused by ill use of nuts and bolts by getting a nut on to a bolt in a cross threaded manner. This is a thing which occurs very often with fine threads and the finer the thread the more likely is this trouble to take place. In view of the extraordinary accidents which may happen through a nut not being properly in its place, it may therefore be worth while saying a few things even on a matter of this sort. One can tell whether a nut is on a cross thread or not, by the fact that it goes on tight when as a rule it goes on fairly easy. The nut should never be so tight as to prevent its being turned with the fingers once or twice to make it engage. Sometimes a nut will not go on the bolt at all, and this is an indication that the end of the bolt has been burred over. This

is a very likely thing indeed to happen if the end of the bolt is struck with the ordinary hammer and therefore when tapping out a bolt or doing anything of a similar nature, which means a blow on the end of the bolt, a piece of brass, fibre, or soft metal should be interposed between the hammer and the bolt end. If a burr of this nature does occur, it should be filed off and the nut may then be fitted quite easily. As an example of the way in which trouble can arise from things of this sort can be mentioned, the breaking off of a bolt when tightening at some important place, such as a bolt used for holding down the cylinder. The usual cause for such a breakage is due to the fact that the operator has been trying to force the nut up against a shoulder of the bolt and has been using brute force when he should exercise a little brain. A washer or two between the nut and bolt will remedy the defect. A thread will sometimes be found to slightly taper, being usually smaller at the top and gradually increasing to a slightly larger diameter at the other end where it meets the shank of the bolt. The result of this is, at a greater or less distance from the end of the bolt, the nut jams on the thread. When this occurs the nut should not be forced, but the job should be taken to a repairer to run his cutting dies over the thread.

Care of Acetylene Lamps and Generators.

A good many owners of motor cars are not getting the best value for their money out of their equipment because of the lack of a little care and attention in looking after it from time to time in order to keep it thoroughly in working order. This extends not only to the large and more important parts of the car, but even down to the small accessories, and as a case in point, reference may be made to the care which is necessary in dealing with acetylene lamps and generators in order to keep them in good order. The mistakes which can be made can be best illustrated by actual experience in the matter. A gentleman who owned a car was heard to say that his lamps would not give a good light, and a man who knew something about his business undertook to look to the lighting equipment and report on it in a friendly way if anything could be done to improve matters. When he



Using a Bicycle Pump

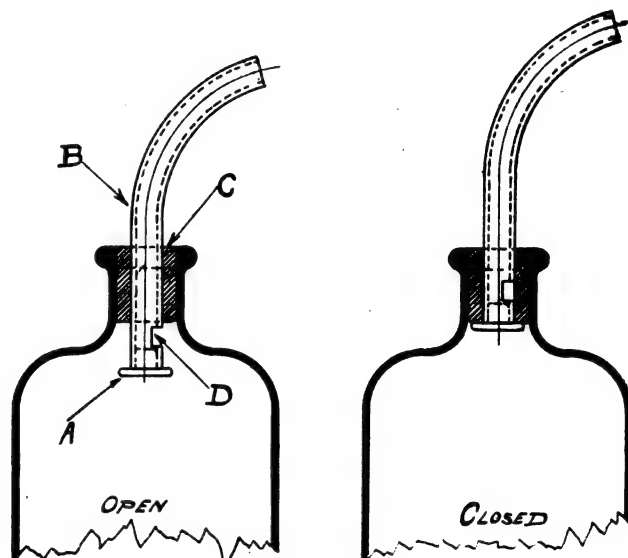
came to examine the equipment, he simply found it suffering from a period of neglect. In the first place, he found that the burners were choked and these were cleared out by using an ordinary bicycle pump. After that he transferred his attention to the filter, and this was found to be dirty, and it was therefore cleansed together with the leads or pipes by fitting the connection of the pipe on to that of the pump. The next portion which was overhauled was the generator itself. This was examined and was found to be choked up with waste carbide. This was thoroughly cleaned out and a fresh charge of carbide was put in. After these simple measures had been taken, the lights were found to burn quite

well and the equipment, which had been giving its owner occasion for doubt and perplexity for some little time, was then found to be in good working order.

This seems an absurdly simple thing to put into print, but it is the absurdly simple things which are forgotten by absurdly simple people, who expect to get good results without taking any means to secure them. If anyone wants to keep his acetylene lamps in good order it is advisable to put the pumps on the burner occasionally and better results are always to be obtained by keeping the generator clean.

For Priming the Engine.

From George H. Waltman, Pennsylvania.—During these cold days, priming the engine prior to starting is quite essential and frequently positively necessary. A



A Fine Priming Device.

little gasoline added to the cocks on the cylinder will produce wonderful results in starting. A clever trick to start without cranking is to introduce a generous supply of gasoline, say a half a wine-glass full to each cylinder, through the stop-cock and then turn on the battery. If the gasoline is of good quality it will vaporize sufficiently by this method to cause an explosion when the spark is switched on from the battery. This gasoline if carried in an oil can is inclined to evaporate out through the spout, unless it is protected with a cap, but an oil-can is not as conveniently carried as a small flat bottle or flask, and if this in turn is fitted with a cork it is also apt to become lost or mislaid.

A safe and convenient stopper is shown in the illustration in which C is a common cork thrust into the mouth of the bottle flush with the top and having a hole previously burnt through its center just a trifle smaller and to conveniently admit a piece of bent tubing. A piece of steel umbrella handle is quite satisfactory. At its straight end a slit D about $\frac{1}{4}$ inch long is filed out and a plug A with a projecting lip is tightly fitted into the end. Soldering this plug is not unwise, although not absolutely necessary, if it is made a tight fit. The head of a 20-penny wire nail will be found to fit snugly and serves the purpose quite well. To secure the cork to its position it is best to bind it down with twine or wire to the neck of the bottle. When now the bottle is tilted the gasoline will flow through the opening D and out the spout B.

Evaporation and flow of the gasoline is prevented by drawing the spout up until the flange A is tight against

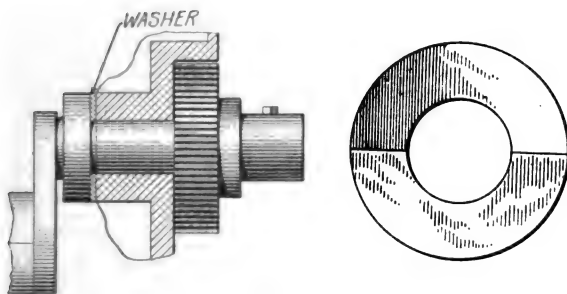
the cork. It will be observed that the opening D is now closed and no amount of rough shaking will allow gasoline to escape.

A stopper of this nature will also be found to be very convenient with gloved hands or cold fingers.

Care of Rims, Tires and Bearings.

There is no more insidious enemy to the rims and tires than rust. In one case, where the car had been out in a good deal of wet weather, the water from the roads had managed to ooze in between the rim and the tire. The tires were taken off and a good deal of rust was found to have collected. The rims were therefore scraped and then sand papered in order to get them smooth, and then the painter was requisitioned to make up some lead colored paint with some linseed oil mixed with it, so that when the paint dried a waterproof skin would be formed. This paint was then applied to the rims so as to give them a thorough good coat, and after waiting a few hours the tires were fitted on again. This was found to give a perfectly satisfactory job. Some people prefer to use, instead of linseed oil paint, which is comparatively slow drying, a quick drying enamel. This is very useful if the car is required out again in a considerable hurry, but where there is no such need for quick service, the lead-colored linseed oil paint will be found to be far better as regards permanence, inasmuch as enamel under conditions of road wear is apt to chip and crack off leaving a bare space which soon gets rusty again. On the other hand, linseed oil forms an elastic skin which lasts for a very long time before getting brittle.

Another point which requires watching is the wear and tear on the main bearings of the engine. In one instance, when a car was out on a rather hilly district, which, owing to the small horsepower of the car, necessitated gear changing on every little rise, it was noticeable that at the moment of changing back, and as the engine was pulling up a hill, a distinct thump was to be de-



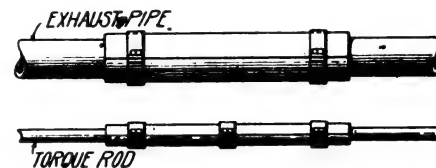
A Washer for a Bearing.

tected, which, upon investigation, turned out to be due to a good deal of play on the ends of the main bearings of the crank shaft. This caused the crank shaft to drop bodily back while the car was on an incline, the crank shaft literally tending to "fall down hill," and this, owing to the small clearances which obtain in a motor car engine, brought the balance weights on the crank shaft into contact with the webs on the top half of the crank case. This, of course, was an evil which had to be remedied with very little delay, as continual knocking of this sort would soon destroy the engine. When the car arrived at the garage, the crank shaft was taken down, and two washers were turned out of a piece of brass. These were then sweated on to the ends of the bearings, and were of course cut into halves, so as to correspond with the halves of the bearings. These were then fitted into place again as shown in the illustration,

and the brass extensions were fitted so as to present an even surface to the crank shaft projection, and on running the car again it was found that this simple device was sufficient to take up the end play on the crank shaft. In this way the knock was obviated for a very considerable period, and the device was the means of saving the expense of new bearings. If any other repair man desires to undertake the same repair, it may be advisable to give one word of caution. Care should be taken, when taking down the crank shaft, to mark the timing gear, or otherwise on re-erection it will be found that the timing is incorrect and the shaft will have to be taken down once more.

Patching a Broken Exhaust Pipe or Torque Rod.

There is a certain class of repairs in motor car engineering which cannot be rated as anything more than a rough and ready means of overcoming a pressing difficulty. Owing, however, to the way in which a motor



Showing the Patches.

car frequently breaks down when out in the country, or at any rate away from the fully elaborate equipment of a properly fitted garage, it is interesting to know of some of the simple methods of more or less temporary repair. The breaking of an exhaust pipe is not, it is true, a very frequent occurrence, but nevertheless it does sometimes happen and the same can be said of a torque rod, this latter frequently breaking, owing to the heavy strain of travelling fast over rough roads, and also when improper and violent use is made of the clutch.

Should a fracture occur the driver can do the job by the following means: A piece of steel bicycle tubing or a piece of brass or gas tubing can be obtained of the same measurement inside as the outside of the fractured pipe or rod. This should then be cut into two semi-circular channels by sawing down the tube lengthwise along the diameter. These two channels can then be fitted over the broken part and held in position by means of two or three clips which can easily be made out of some very thin strip iron. If they are available, some water pipe clips will answer the purpose just as well, the idea being to bind the sleeve thus formed on to the fractured parts. The tube or rod is then as firm as ever possible. This will effect a repair which will last for some time, but such a temporary repair should not be allowed, by reason of its continued satisfactoriness, to become a permanent matter, but a new pipe or rod should be fitted at the earliest possible opportunity.

Good Use for Washers.

There are right and wrong ways of dealing with even a washer, and there are some possibilities about washers which may not have been fully realized by every one.

On one occasion, after coming in from a long journey with the car, the driver noticed that the back panels of the body were smothered with grease and oil that had worked out of the brake drums on the back wheels. The car therefore did not present a very pretty sight, and when it was washed it was found necessary to use kerosene to remove the grease, and this naturally was very much to the detriment of the varnish on the car body.

It therefore became necessary to see whether anything could be done to effect a cure. The wheels were taken off, and it was found that between the casing of the back axle there was a space of about one-half inch on one side and about three-quarter inch on the other and this allowed the grease to come through. In order to remedy the matter, a piece of thick felt was cut to the required shape with a pair of washer cutters. The center was cut out and the hole had to be pretty exact so as to be a tight fit on the axle or else the grease would have found its way through. These washers were then put on the

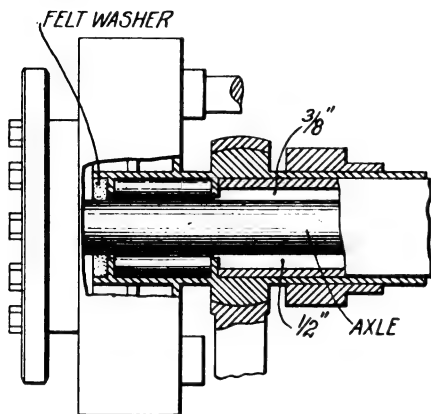


Fig. 1.

axle as shown in Fig. 1, and then the wheels were fitted on again, and it was then found that no grease was able to work out. The biggest difficulty about this arrangement was that of cutting down the felt washers to their right thickness, and it will be seen that if they are too thick they will not allow the wheel to go right into its position. The matter is mentioned inasmuch as it may not occur to everyone that this is one of the uses for that simple thing, a washer.

It is often found that it is required to take up the play on a shaft, and for this purpose a washer is required to pack it up. In a good many cases the only washer which is available is too thick. On the face of it, it sounds a very simple and easy matter to put the

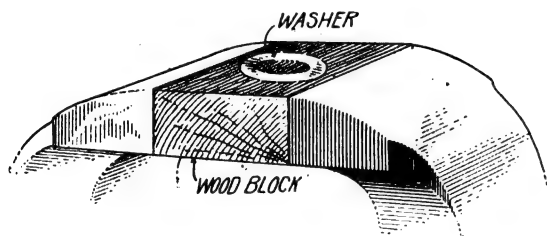


Fig. 2.

washer into a vise and file it down, but if anyone tries to do it he will find that there is more excitement in it than he anticipated. The washer will be found to rock about to such an extent as to make accurate filing impossible. The only way that the writer knows of to do the job satisfactorily is to get a block of wood with a soft grain and embed the washer firmly in it, as shown in Fig. 2. If this is done and the wood is fixed in the vise, both the wood and the metal are filed down together, and thus the washer can easily be made thinner. By this means, if the file is held properly, the washer is filed true.

Repairing Wheels.

In relation to the repair of automobile wheels, upon which we have had requests for information, it may be stated that the ordinary shop does not usually have facili-

ties for doing this work the best and quickest way. An application for information made to Phineas Jones & Company, of Newark, N. J., probably the oldest and certainly one of the best known wheel manufacturers in the country, brought out the following reply:

"In the repairing of auto wheels, the party having such repairs done, should go to a manufacturer of auto wheels to get a proper job, as they have all the facilities for heating off the metal band and shrinking it back on again. They also have lathes with which to make exact duplicate of necessary spokes needed. They are also better prepared to place the felloes on the wheels, if new ones are needed, and get just the proper amount of draft. It is a particular job to repair these wheels and make them as good as new wheels, and unless one is properly equipped, it is impossible to make a first-class job of it."

Types of Automobile Drivers.

From O. H. Hampton, Indiana.—There are two automobile owners in this region who are samples of two types of auto drivers. One of them is a reckless drier, who never reduces speed for teams he meets, nor pays the least attention to horses that are frightened, and keeps in the middle of the road regardless of whether there is room for the teams he meets to pass him. That man has the curses and imprecations of half the people he meets, and the other half regret that their consciences don't permit the use of bad words. That man could not get any one who knows him to help him home with a tow, no matter how badly he needed it. It has also been noted that he has been troubled with punctures that somehow occur on his private driveway, and it is probably only a coincidence that an accident occurred which made a total wreck of his car, which is another proof of the fact that a man generally gets just what is coming to him. If a man gets the ill-will of his neighbors, there are certain of them who will lay awake of nights studying how to get even.

The other driver mentioned above is speed crazy; but he is speed crazy only where the road is good, nobody in the way, and he has no passengers who have put their lives in his keeping. This man never approaches a team without slowing and very closely watching it. If there is any indication of horses getting frightened, he takes every precaution and is ready to get out and help get a frightened horse past his machine. He always gives a team all the road that it will admit of, and in overtaking a heavily loaded team, he always shouts to the driver to stay in the middle of the road if there is room enough to get past. He does the same way in meeting loaded teams. On four occasions this man has been compelled to call on a neighbor for a tow, the distances being two to four miles. Two of these tows were when the weather and the roads were as bad as they ever get, and one of the teamsters asked if 50 cents would be too much of a charge. The other one was offered 75 cents but refused to take more than 50 cents. On the other two occasions the teamsters hooted at the idea of charging anything.

There are occasionally drivers of teams who seem to purposely annoy car drivers when opportunity offers. For instance, roads in some places are wide enough for vehicles to pass if each party gives half the road, but not wide enough if one vehicle keeps the middle of the road. In such cases, these fellows when being overtaken by an auto will keep in the middle of the road. For such people, it is a good idea to have a few copies of the State automobile law, and mail these fellows one. The writer has observed that next time they are overtaken by a car they are quite reasonable.



This department is intended as a "trouble clearing house" for car owners, dealers and repairmen. Inquiries in relation to marine motors will likewise be answered, as they are of interest to car owners and others who use the two-stroke cycle engine.

Readers are requested to make criticism and comments or to freely discuss any subject of interest to the automobile industry, and to add information of their own experience in remedying troubles.

Inquirers are asked to give the fullest information in every case so that replies may be made intelligently, and thus be of interest not only to the inquirer but to others

804 Probably Due to Carbon.

From Roy Jones, Iowa.—Myself and brother-in-law each have Model E, 1911, Brush cars, which we bought new last July. His car gave him good service until about the middle of September, when it commenced to miss fire when running on high at a speed of from 18 to 20 miles per hour. This car will run on low and never miss fire. It will run on high from 10 to 12 miles per hour and never miss fire. But if the speed is increased to 16 to 20 miles per hour, it will begin to miss fire, back fire through the carburetor and knock very loud in the cylinder until it comes to a stop. By immediately turning the starting crank the engine will start and run as good as ever, until the speed has exceeded 12 or 14 miles per hour, when it will stop as before. When the engine begins missfiring and knocking, we must pull the engine neutral, or the car will stop. Then with the engine running neutral, we can open or close throttle and it will have no effect, or make the trouble worse or better, neither will retarding the spark make any difference. But the instant you advance the spark one notch or more, it will never make another explosion until the spark is again retarded to where it was when it began missing fire. Also, while the engine is missfiring, we can pull the key from the switch and the engine will still run irregular until it dies the same as with the key in. We concluded this was a "short" in the coil, so we took the coil from my machine and placed it on his, with the same results. Then we concluded it was a short in the wiring and proceeded to get a complete set of new wiring throughout; still the same results. Then we removed the timer from my car and placed on his, with no better results. This car is equipped with a Kingston carburetor and a Jacobson coil with six dry cells for ignition. We also took this car to the agent from whom we bought the cars. He owns a garage, and is a first-class workman, and supposed to be a good trouble finder, but he failed to locate the trouble. The carburetor seems to work best with a little less than three-quarter turn open of the needle valve. We are both subscribers and readers of your valuable magazine, and have searched thoroughly, hoping to find our trouble, but as yet have not. If you can give us any information, it will be greatly appreciated, for it is very annoying to be out in a car that behaves like this. The only consoling thought one can have is that he will not be arrested for exceeding the speed limit.

Reply.—To diagnose the cause of your trouble, would have been easier had you specified whether or not your exhaust showed too much gasoline in the mixture, with resulting black smoke. Backfiring through the carburetor is usually caused by too poor a mixture, although

it can be caused by "stuck" inlet valves. We should advise you to examine the inlet and exhaust valves carefully and see that they are free in the guides; see that the exhaust valve springs are not "set" making them too weak, and next carefully overhaul your carburetor and gasoline piping, looking for water or dirt to give impeded flow to the fuel. The lever that operates the float valve may bind slightly, or the float itself may "stick." The fact that the motor gives the most trouble when the throttle is open would seem to indicate that the increased compression due to the open throttle caused preignition from carbon deposits. For it to continue to ignite after pulling the switch key, would also seem to indicate deposits of carbon in the cylinders and on top of the pistons. We do not believe the trouble lies in the ignition system, but in faulty carburetion in the valves themselves, or to carbon deposits.

805 No Distributor.

From W. A. S., Illinois.—In the last issue I see that Guy C. Booth, Iowa, asks why a two-cylinder motor with Splitdorf magneto and non-vibrating coil sparks on both high tension leads at every revolution of the motor. You answer that there is undoubtedly a short circuit in the distributor. I think investigation will show that there is no distributor on this ignition outfit. The usual two-cylinder magneto has only a circuit breaker, and spark is furnished at both plugs every revolution, the cylinder which has compressed the charge being the one to make use of the spark.

Reply.—Double-opposed two-cylinder motors, or two-cylinder motors with crank pins in line, can use magnetos without distributor and designed to give two sparks, one in each cylinder, simultaneously. If a distributor is used, unless designed to give two sparks in each cylinder for sparks to appear in two cylinders simultaneously, it would show conclusively that a short circuit existed in the distributor. If no distributor, it is quite evident that no such short circuit could exist.

806 Needs a New Float.

From Samuel Gash, Illinois.—What is the matter with my carburetor? It leaks at times. My float seems heavy when I press it. My carburetor is a constant float model for the Oldsmobile. One of my spark plugs on the front cylinders gets black with carbon and I have to clean it every other day. The engine will not start if left over night unless I use hot water. The car has just been overhauled. I have ground my needle valve and it doesn't seem to stop the leak. Is it the float? When I remove the manifold it is wet in the inside with gasoline. I wish you would give me some information to assist me.

Reply.—You probably need a new float for your carburetor. If your fouled spark plug is on the first cylinder, it may result from an excess of oil in the timing gear case. The remedy would be to wash out carefully with kerosene and reduce the amount of oil fed to the front bearing or front cylinder. The necessary use of hot water to start the motor is due no doubt to the much heavier gravity of gasoline now being furnished by the manufacturers and refiners. We think the leak of gasoline is no doubt caused by a loaded carburetor float.

807 Electric Lights for Ford Cars.

From T. E. Elliott, New York.—I have a 1912 Ford car and would like to equip it with electric head and tail lights, and if practical, connect the same in parallel in-

stead of series. Will you kindly advise what volt and candle power lamps would be suitable for this method of wiring?

Reply.—If connections are to be made in parallel, the burning out of one lamp would not put the others out. We are advised by the parts and repair department of the Ford Motor Company that the Vesta Accumulator Company of Chicago, are furnishing a large proportion of electric outfits purchased by Ford owners, and they can give you full information. The Vesta Storage Battery Company have a New York office at No. 1781 Broadway. We think this is the concern mentioned as the Vesta Accumulator Company.

808

Stuck Pistons.

From J. C. De Puy, New York.—I have a Winton-four and the pistons seem to be fast. I had water in the radiator. Cranked it once and ran it only a little while. The next time I went to crank it I could not start it. What should I do to get the pistons loose? I have used kerosene and lubricating oil, but it doesn't seem to start them.

Reply.—You will probably have to remove the cylinders and rig up some device by means of which a strong pull may be exerted upon the connecting rods, to draw the pistons. It will not be safe to attempt to drive them out. If impossible to draw the pistons, it may be necessary to break them in order to remove them. One method sometimes used is to get as much strain on the connecting rod as you dare, and then explode a charge of gas in the cylinder, the valves being in place. This sudden jar will sometimes loosen them.

809

Carburetors.

From J. L. Smith, Indiana.—I have a Ford Model T touring car which was equipped with a Kingston carburetor, but it being difficult to start the motor in cold weather, I thought the carburetor was at fault, therefore I exchanged for a H. I. Holley 1912 Model, and find that the motor responds to the spark lever much better, increasing the speed from about the third up to the sixth or seventh notch. Would the Ford Model T start easier in cold weather with batteries? Where is the Krice carburetor manufactured?

Reply.—The Kingston carburetor has a good reputation and quite likely someone else may have had quite different results with it. It does not follow because one person does or does not succeed with a carburetor that it is superior or inferior.

A Ford Model T would probably start no better with batteries than with the magneto in cold weather. Whenever difficulty is experienced in starting this car, it is due more to the fault of the operator than to the car. The Krice carburetor is made at No. 919 Larned street, East Detroit, Mich.

810

Several Queries Answered.

From John P. Hood, Michigan.—1. What is the sound given to the letter (e) in the word carburetion? 2. Does a given secondary impulse of a vibrator coil die out before the following primary contact is made by the vibrator? In case it lasted over, both secondary and primary currents would (in most coils) be flowing through the primary coil at the same time. Would they interfere with one another? 3. When a low-tension magneto is used with vibrator coils, does the coil vibrator make one contact or several for each firing of a charge? 4. As a magneto circuit-breaker can be used instead of the coil vibrator, can coil vibrators not be used in place of the

circuit-breaker? 5. In regard to the wiring of the Cadillac 30 touring car of 1909 (with Splitdorf low-tension magneto), will you explain the use of each of the three wires leading from the lower part of the magneto to the coil-box? 6. Will you please explain the need of and the operation of five condensers with a four-unit master vibrator outfit?

Reply.—1. Long, as in resign. 2. It is the breaking of the primary circuit that induces the impulse in the secondary wiring, accordingly the secondary flux is extremely rapid and is over before the following primary circuit is closed. As the vibrator is returned to close the circuit by means of a spring, and as the action of any spring is limited to a certain number of vibrations per minute, the secondary flux is always more rapid than any spring can be and there could be no flowing of both currents simultaneously, consequently no interference. 3. Several. The shorter the distance between the contacts the more the vibrations, and the faster the motor the less the number of the contacts. It may be possible to run a motor so fast that but a single spark would occur even with a vibratory coil. 4. The circuit-breaker of a magneto makes first a primary circuit, and then breaks the circuit at the "peak" or greatest intensity, occurring twice in each armature rotation. Thus the sparks would begin to appear when the current gets sufficiently strong and stop when the interrupter breaks the primary, timing would be erratic and results consequently poor. 5. One wire leads direct to one of the coil terminals, another to the switch, the primary circuit being completed through the switch and an additional wire to the other primary coil terminal. The third wire leads also to the switch in order to short circuit it and prevent the battery from discharging through it. 6. The object of a condenser is primarily to prevent sparking at the vibrator contacts and to intensify the primary at the time of break. Some systems employ but a single condenser.

811

Uses Too Much Oil.

From A. R. McClune, Pennsylvania.—I have a Ford Model T touring car that I am having trouble with. The engine carbonizes up in a run of about 100 miles. I use Polarine oil. Would it hurt the power of the engine if I drilled an oil hole in the piston? Or, would it be better to put on a force feed oiler, say the Apco system? Has anybody used this system on the Ford cars? How are the Woodsworth treads? Does the mud and water get in them?

Reply.—You are probably using too much oil. Clean your motor and crank case out carefully with kerosene and use fresh oil in the manner advised by the manufacturers of your car in their instruction book, which every Ford owner should own. Drilling oil holes in the pistons will do no harm as long as they are below the lower rings. We are not familiar with the Apco system and do not know of any one who has adopted it for a Ford car.

812

Why It Pounds.

From T. R. McCracken, Iowa.—I have a Model T Ford. Sometimes it pounds when pulling hard on high gear. I have changed the throttle and spark with poor results? Can you tell me how to overcome the trouble?

Reply.—The pounding you refer to is probably due to accumulations of carbon in the cylinders. This would cause the explosions to occur too soon, although a mixture too rich in gasoline will cause pounding. The remedy for the former would be to remove the carbon and for the latter to reduce the gasoline supply slightly for

high speed, by either adjustment of the auxiliary air supply, decreasing the tension of the adjusting spring, or closing the needle valve slightly.

813 Too Rich Mixture.

From H. S. Bemsderfer, Pennsylvania.—I have been working on a Waterloo engine which is a two-cycle engine such as are used on motor boats. The engine ran all right for a while, but now it makes an explosion at every other revolution same as a four-cycle engine. Can you tell me what might be the trouble?

Reply.—The mixture is probably too rich. Increasing the proportion of air or decreasing the gasoline supply may be your remedy. Your ignition current may also be too weak, plugs sooted, or some part of the ignition system defective. You should have mentioned whether ignition was make and break or jump spark.

814 Six Cylinders and Carburetors.

From Thomas Hunter, M. D., Mississippi.—I wish to ask through the columns of your journal this question: What information can be gathered from the fact that when my motor is climbing hills or running at high speed, all six cylinders explode as they should and when running slow, two and sometimes three cylinders explode irregularly. All the valves are ground good and tight, the Bosch magneto is just back from the factory and the Connecticut coil has been overhauled at their factory. This should mean something to a mechanic. I haven't found the trouble and would greatly appreciate any suggestions leading to a remedy. Will say the motor has six separate cast cylinders, two spark plugs to each cylinder, the valves are operated from the cam shaft on opposite sides; Schebler carburetor. I have spent hundreds of dollars, all my summer and autumn and part of the winter, and the thing still thumps along—jerking, creaking, groaning, and altogether as miserable as its unfortunate owner. Thank you for some light on the subject.

Reply.—Your trouble is quite likely either due to carburetor troubles or to too weak exhaust valve springs. A six-cylinder motor tests a carburetor harder than any other construction. A large share of six-cylinder cars are equipped with Stromberg carburetors. You do not state what model of Schebler carburetor you are using, and while this carburetor is a good one and has a high reputation, it might be advisable to substitute a Schomberg carburetor for it.

815 Auxiliary Air Exhaust.

From Hawkeye Auto and Supply Company, Iowa.—We would like to get a little information. A party has a Model H Corbin, No. 505, and wants to know if it will reduce the power very much to use an auxiliary exhaust. What size would you recommend, and would he have to change the timing of the valves? This car is the air cooled.

Reply.—Properly constructed, the auxiliary exhaust, using mechanically operated valves, should not reduce the power, but if by auxiliary exhaust you mean simply ports that are uncovered when the pistons are near their lowest position, you would not be able to throttle the motor, for as soon as the throttle is partly closed burned gas will be taken in at the end of the induction stroke. The timing of the opening of the exhaust valves should be changed, made later, occurring before the piston covers the port opening on its exhaust stroke. The object of the auxiliary exhaust is to prevent the exhaust valves from overheating, the major part of the exhaust gas passing out before the main exhaust valves open. We

would not recommend a diameter less than one-half that of the exhaust valves which would give you a clear opening of approximately 25 per cent. The ports in the cylinders should not be too wide. To make this change would be a very expensive experiment, and, unless one was fully competent and conversant with automobile motor design and construction, there would be a strong probability of failure to get desired results.

816 A Bent Crankshaft.

From C. E. Little, Nebraska.—I have a Model 14 Buick which has a knock in the motor that I have been trying to locate. Have had all the bearings taken up, but the "pound" is still there, and I have come to the conclusion that the crank shaft is bent, because the drive shaft was broken, and when the new one was put in, the clutch was filled with heavy oil, and being cold weather, this would not let the clutch release which would jerk the engine very severely when thrown in gear. After the new shaft was put in, I could hear that the car had a different sound, and after running about 30 miles it commences to knock very badly, and as the fly-wheel and the front end of the shaft runs a little out of true, I have concluded that this is the trouble. Can you tell me if a crank shaft can be straightened? I have written the Buick Company, and they say it cannot, and I will have to get a new one. Will you please give me your advice, what do you think of the Motz cushion tire for a light car on country roads?

Reply.—It is no very difficult operation to straighten a bent crank shaft, but the mechanic who attempts the job should be experienced in such work and should have necessary facilities. You could hardly expect it to be as good as new. The better the quality of material used naturally the better the results.

The Motz tires are said to be good for the purpose referred to.

817 Transmission Trouble.

From Theo. Kopf, New Jersey.—I have a Model S Ford roadster, and of late have experienced some trouble with the transmission (which is of the planetary type) while traveling uphill in low gear. I find that while my engine runs good and develops ample power, yet my clutch slips. This speed is controlled by a friction band and had formerly a fibre lining. I took the band off and found the lining was worn out. I then put in a lining of good solid sole leather. It is somewhat better, but still not satisfactory, and in order to make it hold sufficient, I have to tighten my band so much that it prevents me cranking the engine when in neutral and would naturally make a drag on the engine all the time when running in high. Could you kindly advise me how to remedy this? Also, how much clearance should there be between the top of the push rod and the bottom of the valve stem when the valve is seated? Is there any way of taking up wear on non-adjustable valves?

Reply.—The manufacturers of your car selected fibre lining because they found it better than leather, and you will also prove this to your satisfaction if you will line the friction band with a more suitable material than leather, charging the cost of your experiment to experience account. The remedy is thus obvious. The thickness of an ordinary visiting card is about the minimum clearance allowable between push rod and valve stem end, thus allowing for expansion of the valve stem due to heat when running. If there is too much clearance, so much that the timing is incorrect, you can fit thimbles over the ends of the valve stems. It is more important to have proper timing of the valves than to secure mini-

much clearance between lifters and valve stem ends. Too much clearance, unless the valves open too late and close too early, may result in a little extra noise, but it should not be noticeable, cheap cars only not having valve lifting adjustments and being not usually especially noiseless in other respects.

818 Lubrication.

From a Subscriber, Ohio.—I am driving an E. M. F. 30, and the company recommends Valve Oil or 600 W. for the transmission and differential gears. As I have an opportunity to buy pure castor oil very reasonable, would you recommend the use of the same in place of the above mentioned oils? Would it be advisable to add graphite to the castor oil?

Reply.—In five barrel lots, pure castor oil is quoted at 10 cents per pound, equivalent to 80 cents per gallon. It is quite reasonably sure that the manufacturers of your car know what oil is best adapted for the purpose. Why not let well enough alone? Graphite is a splendid lubricant for some purposes, but we should hardly care to recommend its use with castor oil, as you suggest.

819 Compression Leaks.

From Perry Matthews, Michigan.—In answer to query, No. 718, from G. W. Horner, Oregon, I have a Metz of the same year and model as the one he mentions. I have not had any better success so far than he. On taking off the top of the crank case, we found the compression leaking past one of the cylinders, and took the engine out of the car and ran it with an independent motor to try and get the cylinder smoothed up. As I had another runabout to use, and not having the time to spare, I did not pay much attention to what success was made in smoothing up the cylinder walls. We also had trouble with the friction drive. Seems as though one wheel turned the set screw loose, which chewed up the material on the outer edge of wheel somewhat before we noticed it.

Reply.—With poor compression as a result of leaks past the piston and rings, there is not even a remote possibility of smoothing up the cylinder by a "running in" process, after the motor itself has been run under its own power. The action of the heat from the explosions and the friction of the moving pistons and rings puts a glaze on the walls of the cylinder. When once this glaze has become broken through, nothing can remedy the damage done except reboring, if there is sufficient metal left (and there rarely is) or a new cylinder. Reboring also necessitates larger rings and piston. The machining of motor car pistons is an art possessed by but very few mechanics, both within and without motor manufacturing plants. Accordingly, we always advise the purchase of new cylinders to replace those "scored" through accident, such as poor machining, core sand or steel chips, or neglect due to overheating or insufficient lubrication.

820 The Engine as a Brake.

From A. L. M., New York.—Please give me the method of using the engine as a brake in descending heavy grades, and if such use is detrimental to any part of the machine, and if so in what particular? Also, tell me what is the best tire powder?

Reply.—Cut out the ignition, close the throttle and let in the clutch on any but high speed. Such use of the brake is not detrimental to the brake or engine. On the contrary, it saves wear on the brakes, it can be resorted to in case of failure of the brakes, it serves to cool and help scavenge the cylinders, and is thus a help in case

of a steep ascent immediately following the descent. The braking power of the engine is increased by running on low speed gear. The best tire powder is the ordinary white powdered talc, such as furnished by any tire dealer. It is too cheap to be adulterated.

821 Muriatic Acid.

From J. Jonasson, Iowa.—In your November, 1911, issue, in an answer to Thomas Malumphy as to cleaning radiators from lime deposits, you advise as a last resort to use a quart of muriatic acid. What I want to know is, how to use this acid. Am I right when I understand that a quart shall be poured in the radiator and water jackets with the water and then let it stand for a time to eat out the lime deposits? If this is injurious to the radiator and water jackets, kindly explain how it may ruin them. I have used washing soda application, but it does not touch the lime deposits. Will muriatic acid be less injurious if I "cut" it with all the zinc it will cut before using it? I have experimented some with this acid and know it cuts lime deposits very fast.

Reply.—Unless you are prepared to purchase a new radiator do not use muriatic acid. Its effect on the metal is very liable to ruin it. As we remember the reply to the inquiry; in the earlier issue stated that the Livingston Radiator Co. said that they would use muriatic acid as a last resort, but would fear ruin to the radiator. The effect of muriatic acid, cut with zinc, would of course be less injurious than raw acid. If used, the radiator should be removed and the acid washed out very carefully. The cylinders should be removed and great care observed not to let any of the acid touch any part of the cylinder that has been machined. The acid should be rinsed out very carefully. To prevent accumulations of lime in limestone localities, use rainwater or melt artificial ice which is supposed to be frozen distilled water.

822 Setting a Shock Absorber.

From a Subscriber, New York.—Can anyone among the many readers of your valuable paper tell me about what number to set my Hartford shock absorber on for both front and rear springs? The car is a 1911 Stoddard Dayton, 20, and weighs about 2,450 lbs. The absorber model is set on the intermediate for a car from 1,800 lbs. to 2,500 lbs. I would like to set these absorbers to carry one person, "the driver." This is a five-passenger touring car and not a runabout.

Reply.—You can best tell the proper setting by experimentation, as the springs of no two cars will be likely to have the same tension, particularly after use.

823 Tire Pumps and Pressure.

From A. A. Wright, Oregon.—How can a tire pump, operated by the device being screwed in the spark plug hole, produce 150 pounds pressure when the compression in the combustion chamber is only 35 pounds?

Reply.—Had you mentioned the particular device you had in mind, we could probably have given you a more definite reply. Your motor may give a compression in excess of 35 pounds when running rapidly. It is possible to construct a device with a piston of two diameters, say one of 1½ inch diameter against which a pressure of 35 pounds per square inch is exerted, and the other one inch diameter, which, with no allowance for friction, clearance or other features, would give a resulting pressure theoretically 2¼ times 35 pounds or 78¾. We do not recall any such device and do not know of any system in use in which spent gas from the combustion

chamber is used for operating motor boat whistles in which the pressure in the tank ever approximates even 100 pounds,, with a compression even of 75 pounds in the motor itself.

824 Wiring Connections.

From Reader, Iowa.—I would like to know how to wire twelve cells series and multiple.

Reply.—Series connection would be to connect the carbon of one to the zinc of another until they were all connected, leaving free the zinc of one and the carbon of the end of the string. The voltage would then be 12 times that of each separate cell, the amperage being the same as a single cell. To connect in multiple, all the carbons should be connected together and all the zincs, the final carbon then in contact with the final zinc would give a voltage equal to that of a single cell and twelve times the amperage. Series-parallel is a combination of both above systems. The usual spark method is to connect three series of four each, and then connect the three end carbons and the three end zincs, thus giving four times the voltage of a single cell and three times the amperage, with very much longer life.

825 Lubrication, Magnetos, Etc.

From Joseph Riendl, Wisconsin.—1, Will you please give me information regarding my 1911 Model T Ford? My trouble is that the differential grease works out into the brake drum on right side of car, rear wheel. Would like to hear if there is any way to stop this grease from working out into the brake drum? When I first got the car there was one felt washer on the axle of the car. Now I have two felt washers on the axle, and still the grease keeps working out into the brake drum. There are a couple of more car owners in this locality that have the same trouble. 2. Is the Ford magneto strong enough to run electric lights and not decrease the power of the car? 3. Will the lights be bright enough to see good with when running at the rate of eight to fifteen miles per hour without using batteries?

Reply.—1. To use a much heavier grease is the only remedy except to replace worn parts. 2. Yes. 3. They should be. Very many owners of Ford Model T cars have them equipped for electric lights, and have expressed themselves as perfectly satisfied with results.

826 Overhauling and Spark Plugs.

From C. E. Ludovici, Jr., Michigan.—I have a Buick car which I purchased last summer and have run the same 3,000 miles, and up to the present have had no repairs of overhauling done, also no trouble. Would it be necessary for me to have the machine overhauled in the shop before I run it this spring? Or, could I do all that is necessary myself? All I did last fall was to jack up the wheels and drain both water and gasoline tanks. Please explain how to clean spark plugs and how often the same should be cleaned.

Reply.—It is a very good, safe policy not to put your motor in a repair shop until it needs it. Sometimes overhauling leaves the motor in worse shape than before being made. The spark plugs should be taken apart and cleaned with a stiff brush dipped in gasoline, and as often as they seem to cause missed explosions.

827 Information as to Starters.

From Stephen D. Horton, New York.—I am running one of the 1906. Reo touring cars. It has two cylinders, rated at 18 h.p. Cranks on the side. In good order. Is there a starter made that will work on this

machine in a satisfactory manner, and at reasonable cost?

Reply.—For a car with a double cylinder motor, the starter manufactured by the Dayton Engineering Laboratories Company of Dayton, would probably be satisfactory. Acetylene or gasoline starters are not satisfactory for two or double cylinder motors. At any rate, this is the opinion we have formed from our knowledge and experience.

828 Chokes and Misses Fire.

From De Wolf, White & Company, Indiana.—If your Trouble Department can give me an intelligent and practical answer to the following inquiry, I shall feel that that alone is well worth the price of admission.

I am the owner of a 1911 two-cylinder Maxwell. The car gives the very best of satisfaction at all times with but one exception, and that is—after the engine has run idle for a few minutes with a closed throttle and retarded spark, and I then try to speed the motor, it will choke and mis-fire for several seconds and then pick up and never miss a shot. At no other time does the engine mis-fire, and it has at all times an abundance of power. To one who does not care whether he is hitting on "all four" or not, it would make no difference, but I like to have my car running just right. I would add that there are probably a dozen of this type of machine here and they are all giving good satisfaction, but at least half of them have the same trouble that I have. My car has been to the factory to have this fault corrected and with a very light adjustment of gasoline I am not bothered much, but to shut the gas off so much it makes the car hard to start and it fails to develop power as it should. A repair man from the factory came here and said that the gasoline level was too high and he put a drop of solder on the gas spray nozzle. This did not help any, and then he said that it should have been cut down instead of built up. If you can tell me what to do, would appreciate it very much as would several other owners of little Maxwell cars in this city.

Reply.—In cold weather particularly, the throttle should always be opened slowly to avoid just such trouble as you describe. Next time you want to run your motor idle and slow, close your throttle more and do not retard your spark. Your trouble is aggravated by the very heavy gasoline now on the market. Please read our reply to W. D. Zimmerman, Virginia.

829 A Cylinder Misses.

● From E. O. Dexter, Oklahoma.—I have an M 17 Buick fitted with Remy magneto and Schebler carburetor. Since the cold weather it has given me much trouble. The second cylinder would miss and get foul. The valves were ground, cylinders taken down and cleaned, spark plugs kept in perfect condition, all to no good. I took the magneto off, cleaned the breaker box and distributor, and when I started the motor, it ran all O. K. on second, but missed on first. It misses badly when the sparker is retarded, but no so bad when advanced to the proper place. It misses more when driving, especially when on a hill. The first cylinder does not get a good strong spark. The carburetor has been adjusted. In fact everything that our mechanic and I could think of, has been done with no good results.

About tire protectors, will say that I am using three cars in livery and use the Universal protector, and have run one set 4,000 miles and never had a puncture or tire trouble, and would not be without them.

Reply.—The fouling of your plug in the second cylinder is probably due to the missed explosions. We would

advise you to rewire your secondary cables from the plugs to the distributor and see that there is not a short circuit in the distributor or a leak of current. The contact points in the circuit breaker should be perfectly smooth and flat. The spark should be the same on all four cylinders. It may be necessary to replace some worn parts in the distributor of the magneto, unless you can locate and remedy the apparent leak in the secondary wiring.

830 A Flooding Carburetor.

From Henry Walbrecht, Nebraska.—I have a two-cylinder Reo car and the carburetor overflows when I turn the gasoline on. I had the front cylinder off and after it had been put back on and the pipes connected, the carburetor commenced to flood. I have not done a thing to the carburetor.

Reply.—Examine the float valve of the carburetor to see if it is well seated. If the carburetor is not properly fastened or stayed, vibration may cause improper seating, and continuous flooding will result. If, for any reason the valve does not seat, grinding the valve so it will constantly seat will remove the difficulty. Flooding is also caused by dirt under the float valve. To avoid this, be sure and strain your gasoline before you put it into the tank. Flooding may also be caused by a sticking of the float or by a cork float becoming too heavy from absorbing gasoline, and if a metal float, by it being punctured. If the float is too heavy, the remedy is to decrease its weight until the gasoline is flush with the top of the vaporizing nozzle.

831 Starting, Lighting and Tire Covers.

From C. L. J., Ohio.—I see a great deal is said about starting the Ford Model T motor in cold weather. We have a Ford which has not been started since last November, being laid up for the winter. Some time ago while reading in *The Dealer and Repairer* how to start Ford motors in cold weather, I decided to try ours and see if I could start it, so one day when it was four degrees below zero, I tried the plan suggested to No. 737, which is in the December issue. I tried it thoroughly, but could not get the motor to start. I then put a cork in the air intake pipe of the carburetor, and poured very hot water over the carburetor and manifold until they were sharp warm. Then I tried the usual way of starting (just as we started it in the summer) but there was nothing doing. I then tried No. 737 again and the motor started without much trouble. Now, to sum it up, here is the way I started the motor: First, put a cork in the air intake pipe of the carburetor and pour on hot water until the carburetor and manifold is warm; second, shut off the gasoline by turning the adjustment on the dash; third, crank the engine three or four full turns and flood the carburetor; fourth, regulate the carburetor back to where you usually run it, put the throttle and spark levers in starting position, turn on the switch, and start the motor.

Is there supposed to be enough oil to go back through the transmission to supply the rear axle? When the hind wheels are jacked up and motor is started, the hind wheels will run unless the brake is set very tight. In this case, would it be a good plan to put some oil in the rear axle direct? Would electric lights run by the magneto exhaust it in time? Would it pay to put leather treads or tire covers on new tires?

Reply.—If your lubricating system is operating as designed, there is no need of oiling the rear axle direct. Electric lights will not exhaust the magneto. Although it depends something upon the roads a car is run on, the

speed, the load, and possibly other conditions, yet tire covers are in most cases an economy. Please read what L. C. G., Iowa, says of tire covers in this issue.

832 Cold Weather and the Generator.

From W. D. Zimmerman, Ohio.—I have a Liberty Brush runabout, bought new last July, and which has given me no trouble at all until the weather began to get cold last fall, and while running for a distance on high speed, when throttling it down, I noticed the engine would commence to pop, smoke, and would finally stop, except in some cases, by throwing the gear off I could sometimes get it to pick up again, but generally I had to crank it again when it would go all right. I put the machine up for the winter then, thinking it was due to the carburetor being adjusted for warm weather, and hoping that when I get her out this spring it would go all right. What do you think is the trouble, and how will I remedy it? I use Standard Oil Company's transmission grease, and I notice they have one kind of this oil they mark as A, one as B, and one as BB. Which of these oils do you think best to use on the transmission of my car in summer months?

I am thinking of equipping my car with gas lights this spring, and I want to find out whether or not I can put my generator on the left hand of the bed of the car, just in front of the speed lever, or whether, by the fenders, not extending clear across like the Standard Brush. I will have to put it back of the seat. I don't remember of ever noticing just where the generator is located on the Standard Brush, but from the picture of this machine, the generator is just where I state I would like to put mine, showing it not resting on the fender, or step, for support. I much prefer putting my generator on the side of the bed of the car, just in front of the speed lever, saving copper tubing and labor. I am sure I can put the generator where I want if it does not have to have the fender to rest on, and whether it has to rest on the fender, or whether the bracket alone will hold it, I do not know.

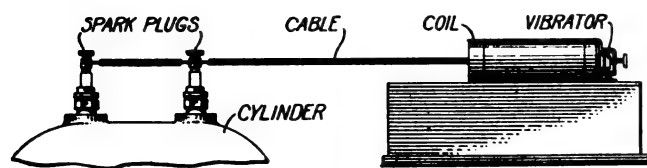
Reply.—Cold weather troubles are more prevalent this winter than last, due no doubt to the much heavier and consequently harder-to-vaporize gasoline. Your carburetor does not vaporize all the gasoline, and it accumulates, in liquid form, in the inlet manifold, until the mixture gets so rich that a lot of it is carried into the cylinders in liquid form, when your trouble begins. The remedy is to conduct hot air from around your exhaust to the carburetor, or use a carburetor of a smaller size, one in which the velocity of the air is higher to assist vaporization. Reducing the amount of gasoline at the carburetor or increasing the auxiliary air may help you slightly. Use the heaviest transmission grease in the summer and the lightest in the winter. You can put your generator wherever it is most convenient. It may be necessary to add a bracket on which to place it.

833 An Ignition Experiment.

From T. O. M., Iowa.—I have a two-cylinder Reo car, 1909 model, and wish to put two plugs in one cylinder and connect the plugs together. I send you a rough sketch to show the idea. Will this give more power, and how much? Will it harm the coil or vibrator? Will it shorten the life of the battery (dry cells)? I believe this will interest many, so I ask you to give the good and bad points. If some reader has tried this, let us hear from him. The cylinders of my car are $4\frac{3}{4}$ -inch bore and 6-inch stroke.

Reply.—According to your sketch, there would be no spark at the plug farthest from your current sup-

ply, unless you used a double insulated plug so that the secondary current, instead of grounding at the first plug, would pass into the first plug, across the gap and then back through another insulated electrode to



Plan of the Ignition.

the second plug, there to be grounded and return to the coil. Such plugs are sold by Stevens & Company, 375 Broadway, New York, and Marburg Brothers, 1777 Broadway, New York. It will have no more effect on coil or batteries than an outside spark gap. It might take a high-grade coil, though, to insure best results. At high motor speed it should increase your power fully 10 per cent.

834 Trouble With His Carburetion.

From P. C. B., Michigan.—1. I have a Model D Brush, 1910, equipped with a Kingston carburetor, which has given me a lot of trouble. It has to be adjusted every few days and newly equipped with needles every little while. Would like to know how a Schebler would work, and what model and size. The motor has a four-inch bore with a five-inch stroke, drawing its charge from the side of the carburetor. If a Schebler will not be fast enough, please tell me some make and where I can get it. 2. Why is it that spark plug porcelain breaks in cold weather? I can't get one but what will. 3. What causes a loss of power after a hard pull or to fast a run, say, 25 miles an hour? Batteries are good and so is the wiring. The coil got damp once and had to be dried. Would that hurt the coil?

Reply—1. Your Kingston carburetor has probably too large a "fixed air" opening for this cold weather. If you will write to Byrne, Kingston & Company, Kokomo, Indiana, they will send you a small bushing to reduce the size of the opening, which should remedy your trouble. This would be much cheaper than buying a new carburetor. The manufacturers of your car should be able to advise you as to the carburetor they consider best adapted to use with their motor. A one-inch Model L Schebler should give good results. 2. We do not know, unless you screw the plugs too hard into the cylinder, which is liable to ruin the best spark plug manufactured. 3. We do not know but it might result from piston rings being badly worn with resulting loss of compression from the oil being blown past the rings on full throttle. It should not have injured the coil unless you baked it good and plentiful.

An Improved Headlight.

From George H. Waltman, Pennsylvania.—We were once unceremoniously left without a supply of gas in our tank. Another tank was not procurable before dark, when a night trip had been planned and invention was relied upon to relieve the embarrassment. It may also be added that the headlight could not be conveniently fitted with electric light from the batteries. Two pieces of common tin, about $3\frac{1}{2} \times 7\frac{1}{2}$ inches, were cut into a shape similar to that shown at E, Fig. 1, and bent to a shape as shown in F, Fig. 2. The dotted lines in E show where the tin was creased or bent and the full lines show where the tin was cut. Four pieces of tin were then cut into a shape similar to that shown at G,

Fig. 1, and rolled or curved to form a holder for a candle as at H, Fig. 2, with two rivet holes, I, in each which secures them to the piece F. A similar shaped piece, J, though smaller, was also made and fastened to the centre of the piece, F. This piece, J, was made just large enough to permit its being slipped over the burner in the lamp after the tip had been removed, and a small button-head stone screw served as a set-screw to hold

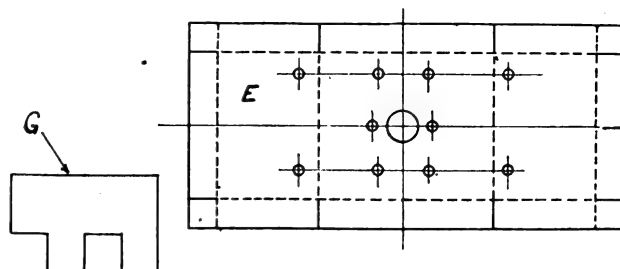


Fig. 1.

it in place. The pieces, H, had previously been riveted in position to F with small hollow saddler's rivets at I, which was all done more quickly than soldering and quite as effective, though not so neat. Next four of the best sperm candles were placed in position in the holders, H, and a small wire nail driven through at K to prevent the candle from jarring loose or becoming dislodged. As stated above, the tip was removed from

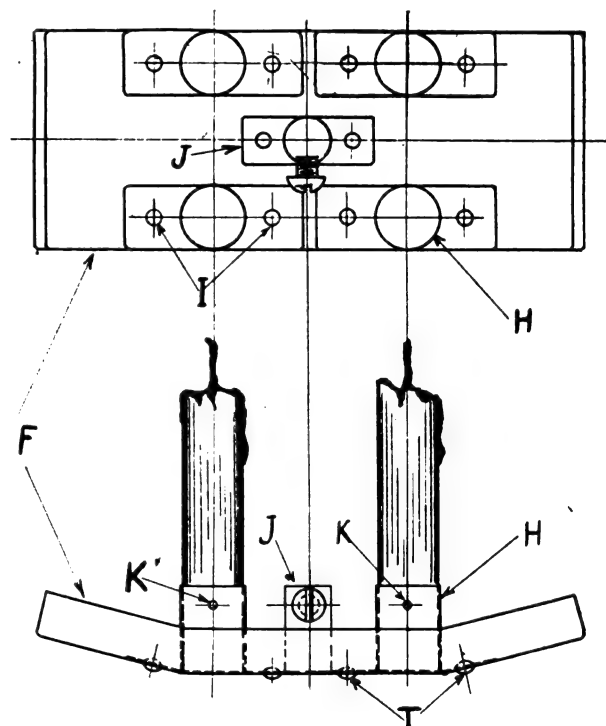


Fig. 2.

the burner in the lamp and the pan or holder, F, slipped over the burner through J, and held in place by the small set screw. When the four candles in each lamp were lighted, the effect produced, although a poor substitute for gas, was sufficient, with the aid of the mirror reflector in the lamp to pick out the road at a speed of 20 miles and get there and back.

Kerosene for Fuel.

From C. L. B., New York.—I would like to ask that those who have had experience in generating steam in automobiles or otherwise, by using kerosene or other low grade oils as fuel, write an account in detail of their experience.

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ADVERTISING RATES MADE KNOWN ON APPLICATION.

NEW YORK, MARCH, 1912.

Missing Numbers—Our Readers are requested to remember that it always gives us pleasure to re-send numbers which have gone astray in the mails.

The Automobile Dealer and Repairer in Australia and New Zealand.

Mr. R. Hill, Matlock House, Devonport, Auckland, New Zealand, is our accredited representative in Australia and New Zealand for obtaining new subscriptions.

GRIEVANCES OF THE DEALER.

The communication of a South Dakota dealer on another page will be read with interest by other dealers who may have had a modified form of the same experience.

Although our correspondent doubtless intended to treat the subject as fairly as he himself wishes to be treated, he is wrong in assuming that any manufacturer whatever is securing his capital to do business by assessing dealers who handle his cars. It is true that such a practice minimizes the risk and somewhat reduces the enormous capital necessary to take advantage of all discounts in the payment of bills for raw material as it likewise permits the purchase, in enormous quantities, of such raw material. But the returns from such sources are simply a bagatelle compared to the cash that must be behind a great manufacturing plant.

Looked at from another standpoint, even under these conditions, manufacturers cannot get paid for their cars until after they have been made, and with such protection against bad bills, the average dealer is thus enabled to purchase cars at lower prices than if he were obliged to help make up for credit losses. Yet, in so far as such deposits are required for the purpose of securing ready capital rather than as a protection against losses, the system is of course unjust.

But that contracts between manufacturers and dealers are, as our correspondent states, "one-sided affairs," must be readily admitted. This is usually the case in transactions between parties where there is not an equality of relations. When one party in such a transaction can say in effect to the other: "These are my terms; accept them or reject them, it is all the same to me," and the other party is unable to secure any better terms elsewhere, then the transaction will be unfair, provided the first named party is inclined to make it so. It is the old

story, handed down from the ages, of the advantage of the strong over the weak, its cynical expression being that "might makes right," although of course might should make nothing but justice, and when it does make justice, it is a noble and glorious might.

But dealers have it in their power to put themselves on a parity of relations with manufacturers, and thus secure contracts that are "two-sided affairs," and just affairs.

Let the dealers organize; not for aggression, but for protection, just as in so many cases the manufacturers are doing, and as they are justified in doing. The other day there was a meeting here in New York of about forty representatives of prominent commercial motor vehicle manufacturers, and they did nothing but what they have the right to do and should do. They fixed the question of a uniform warranty, they fixed upon a certain standard of load and of speed, and they did other things for self-protection which were not inimical to commercial vehicle owners or to the public welfare.

Let automobile dealers thus form organizations for similar self-protection. Possibly the incipient step should be the formation of county or district organizations, and these should be subsidiary to or parts of State organizations, and the State organizations should be federative of one national organization. Steps of this kind are being taken in every kind of business and by every department of business, and because such organizations are everywhere being formed, it is all the more imperative that dealers should form them. Where all are individually independent, then no individual need fear another individual. But where a large part and a rapidly growing part are collective and thus easily able to dominate the individual, then such individuals have no other alternative than to unite for their own protection.

Such organizations of dealers, with identical interests, could easily redress any grievance from which they now suffer and protect themselves from the unscrupulous, both within and without.

Gentlemen, the time is ripe for it. The sooner you form such organizations, the sooner will the abuses from which you now justly complain be dispelled.

TIRE GUARANTEES.

No doubt there are unscrupulous car owners who try to deceive the manufacturers when their pneumatic tires fail solely because of hard use, and possibly they succeed in many cases. To just this extent the cost must come out of the honest users of tires, for they must pay for the extra expense in the additional price that must be fixed to make up for such losses.

But we hardly think the remedy for this situation is as suggested by a reader who on another page favors sending out tires without a guarantee. If there were no guarantee unscrupulous manufacturers would probably impair the quality and the purchaser would have no redress whatever.

It is true that there is one wholesome remedy for all such questions between producer and consumer. The consumer may purchase nothing except from producers of the highest reputation. This practice is more common in England than in this country. There a trade-mark and a name stand for a guarantee year after year.

But in this country there has recently been a decided movement of the somewhat paternal form whereby purchasers are protected by the government. Here pure food, pure drugs, honest weight, etc., are insisted by legal enactment. Of course, the public might protect themselves by scrupulously avoiding the purchase of

anything that is not just as represented; or at all events, such purchase need not be made but once; and then, from lack of patronage, the dishonest producer would be obliged to either go out of business or mend his ways. But having assumed that the "public likes to be humbugged," this government exercises its paternal care for us, and we are in this way protected from the unscrupulous.

This being the practice, and the purchasing public having been led to expect such protection, automobile tire guarantee seem to be necessary, even though the unscrupulous abuse them.

AUTOMOBILE ABUSE.

Nothing that a man owns does he abuse so flagrantly as his automobile. In little things where abuse will cost him but a few cents, he is often obsessed with thoughtfulness and care. But he thinks nothing of going out to ride and by sheer wanton carelessness and indifference reducing the value of his automobile from \$50 to \$100 worth.

Too often we hear him remark: "I've got this car to enjoy, and when it is worn out, I'll get another." It does not seem to occur to him that he will get far more enjoyment out of it if he uses it rationally and intelligently than if he uses it foolishly and recklessly.

Nothing else that he owns or uses will stand such knocking and straining and pounding and twisting and rubbing and pressing and bounding and throwing and heating and beating. And even if it would, he could not be prevailed upon to give it such abusive treatment.

Use your car as wisely as you do anything else you own, and you will treble the service you get from it and possibly reduce by two-thirds the cost of its up-keep.

NOT WANTED.

A wealthy newspaper owner of New York made a bequest of a million or two in his will to found a school of journalism. Why?

There is no scarcity of journalists. There are two newspaper men for every job. They are thicker than "leaves in Vollambrosa." Any school that turns out more of them is positively cruel. But now we hear some one remark that while there may be no need of more journalists, we surely want better journalists. Wrong again; we may need them, but we surely do not want them. The journals made by better journalists are usually gasping for financial breath and in the doldrums of adversity. The worse the journal, the better it succeeds.

What is really wanted is better readers—a public—which can distinguish a good journal from a poor one, and these can only come from the products of public schools and homes where virtue and duty are placed far above "getting on in the world."

SUGGESTIONS AND CONFESSION.

Will readers please not ask us for information "by return mail?" Truth and knowledge often lie down deep in a well, as it were, and a bucket must be let down for it and then it must be hauled up, and that which is worth most is down deepest and comes up hardest.

Sometimes questions are asked which the editor can answer instantly, but in most cases they require investigation and inquiry, and possibly a consultation with some expert who is not close at hand.

It is a great pleasure to give the necessary information at once, and, indeed, it would be gratifying if we

could be the *index rerum* and the *vade mecum* of all our good readers who have some trouble with their car, or with anything else, for that matter; we care less for the kind of information that is sought than for humiliation that we know so little. The "tree of knowledge" is so vast and it has so many little twigs and roots, to say nothing of its great limbs, that no one can hope to acquire much of it.

But it is fortunate that we can teach each other; that what often seems so difficult to the one reader and to the editor himself, and to those who assist him, seems so simple and easy to some other reader. And right here we want to thank you from the bottom of our heart those who are so generous in supplying such information.

Meantime, we will do our best to be prompt, to be painstaking and to be explicit and thorough in giving specific information, and in the wider field of general information to move constantly in the domain of thought and to keep in the van of progress.

IN THEIR OWN LIGHT.

Complaints still come in concerning the high prices some manufacturers charge for spare parts. In reply, we can only say that manufacturers who give valid reason for such grievances stand in their own light. It makes the car owner distrustful. Although he may himself like his car and be satisfied with it, he is not likely to go out of his way to recommend it to another.

Indeed, we are sorry to feel that some will go out of their way to do another an injury where they feel there is a cause for it, rather than go out of their way to do another a favor where they have cause for it. It is the old story of revenge arriving at its destination before gratitude has put on its boots. "'Tis true, 'tis pity; pity 'tis 'tis true."

LET WELL ENOUGH ALONE.

When you purchase a car, do not try to improve it. In nine cases out of ten, yes, in ninety-nine out of one hundred, you will only injure or impair it. Let well enough alone.

With far wider knowledge, resources and experiences, the manufacturer has probably spent months of time and thousands of dollars in experiments and tests to secure the best results.

Of course, you want your car to run satisfactorily, but the manufacturer wants it to do so possibly thousands of times more than you do. Do not change the carburetor, or the size of the tires, or the gear ratio, or the springs, or add or subtract in any way until you have consulted the manufacturer.

A HUNDRED PER CENT. INCREASE.

Last month we explained the probable action to be attempted with respect to second-class postage. Since this was printed, the commission appointed by the President has reported the result of its investigations and it substantially approves of the increased rates recommended.

It is apparent that the Hughes commission has made its report without a thorough comprehension of existing conditions. It is by no means as simple and easy a matter as this commission seems to think to double the cost of an important item in production, and yet this is what the proposed increase of 100 per cent. in second-class postage amounts to. Subscription rates for periodicals have long been based on the present rate of one cent a pound, which was authorized by Congress some twenty-

five years ago. It is for this reason that the people of the country have been enjoying such low subscription rates, yet apparently without any proper understanding of what it means, this commission reports that the doubling of the rates of postage is not likely to work any hardship to anybody. It means to the publishers a tax of over \$6,000,000 a year, which ultimately the readers of periodicals will have to pay.

Of course all this will enforce a large increase in subscription rates on all periodicals, not only the magazines but the agricultural and religious journals and class and trade papers, all of the utmost educational value.

Just why Congress should be asked to impose a serious burden on the literature of the people, in order to make the Post Office Department self-supporting, when no other department produces any income, is beyond the comprehension of the ordinary individual.

If our readers agree with us that they do not want to pay any more for reading matter than they are paying now (and we can see no reason why they should), we trust that each one of them will write to his Congressman and the two Senators from his State, protesting against any raise in the rates of postage on periodicals. If you don't know the name of your Congressman, you can obtain it without doubt from your postmaster, and you can also easily obtain from him the names of both your Senators, if you don't happen to remember them.

A letter also can be sent, to great advantage, to the Chairman of the Committee on Post Offices and Post Roads, House of Representatives, Washington, D. C.

HOW TO DOUBLE THE FOOD SUPPLY.

In point of fact, the automobile is one of the most potent factors in reducing "the high cost of living," instead of increasing it, as has been thoughtlessly charged. It requires seven times as much food for a horse as it does for a man. If the horses of the country could be reduced one-half, or 12,000,000, those who are now raising food for that number of horses might raise food for 84,000,000 persons. On the other hand, a fairly good-sized truck will do the work of six horses. Thus, the addition of 2,000,000 trucks would increase the food supply about one hundred per cent.

Still another means by which the automobile will reduce the cost of living, but one which has before been referred to, is the lessened cost to the farmer in their use in hauling his produce to the markets. In the case of fairly long distances, it at present costs the farmer as much to get his produce to the market as it does to raise it.

WIRE WHEELS.

This magazine was the first to recognize the fact that wire wheels are, all things considered, preferable to wood wheels, considering the durability and comparative cost of each. Wire wheels are stronger, more elastic, and more durable. The only objection to them is that it requires more time to keep them clean.

The Elmore Two Cycle Engine.

In an article in a recent issue giving a description of the Elmore car, it was stated in relation to two-cycle engines that crank case compression is used in the transmission of the incoming charge. This remark was intended to be general, and as such it is correct, but it evidently gave the idea that the Elmore two-cycle engine is of such construction. This is not the case. The Elmore car manufacturers attribute their success to the

fact that they some time ago discarded the crank case type of motor. In order that there may be no misapprehension, the following description of the working of the Elmore engine is given:

When the piston is at the bottom dead center of the stroke, a charge of gas is admitted by means of a rotary distributor into the upper portion of the cylinder. The cylinder raises, compresses the gas at the same time the lower half of the piston pumps a charge of explosive gas into a rotary distributor. The cylinder fires, and at the bottom of the stroke the burned gas is expelled by the incoming charge admitted to the cylinder by means of the rotary distributor. This action, of necessity, must be alternate. In other words, the pump portion of No. 1 cylinder forces the charge of explosive gas through the rotary distributor into the firing chamber of No. 2 cylinder. The pump cylinder of No. 2 cylinder forces the charge into the explosive chamber of No. 1 cylinder—this operation, or cycle, being repeated each revolution of the engine.

The Kind of a Car Needed.

From T. B. Maness, Missouri.—I am interested in the sale and repair of automobiles. Each year makers are increasing the wheel base and making changes in other minor things. The makers of cars expect country people to buy, and while the average country merchant wants a car, he will not buy when driving is laborious and no pleasure on country roads. There are road beds in this country of 10 miles to 50 miles suitable for high speed work, but the levers must be juggled every mile or so on account of lack of sufficient horsepower. If some reliable maker will pull away from the old habit of lengthening wheel base and other alleged improvements and make the cylinder castings just a little larger bore, or say 5-inch bore and 6-inch stroke, and add just a little to the size of the crank shaft and bearings and have less teeth in the gears but make them larger, it will be an improvement for cars that are used in this part of the country. I should say a 4-inch pinion gear would be better than a 3-inch. Other parts may be left as they are now. Changes of this kind would, I believe, add to the sales of automobiles.

I would like to hear the opinion of other mechanics on the point of needed improvements in automobiles. It seems to me that if the right kind of car can be produced, it will greatly increase the sale of touring cars.

An Unusual Accident.

From O. H. H., Indiana.—Some time ago, The Jones Hardware Company, of Richmond, Ind., bought a three-ton truck. Their store is arranged for wagons to back onto the freight elevators. Soon after the truck came to hand its driver undertook to back the truck on the elevator platform and did not notice that the platform was not in place, it being at an upper floor. The truck landed wrong side up on the concrete cellar floor after a drop of nine or ten feet. The driver was thrown several feet clear of the falling truck, and was only slightly injured, neither was he discharged on account of the accident. The bill for repairing the truck was slightly more than \$300.

Effect of Cold on Dry Cells.

From O. H. H., Indiana.—A dozen dry cells that had been partly used were tested after being exposed to a below zero temperature for a week. They tested 10. After being in a room heated to 60 degrees, until the cells were fully warmed, they tested 15. No doubt motors sometimes do not start, or rather cannot be

started, in cold weather on account of the chilled condition of the dry cells.

Some Experiences of a Dealer.

From a Dealer, North Dakota.—I have been agent for a popular priced line of cars for some five years, handling one line exclusively every year excepting one in which I sold two cars of another make, knowing that these customers would not buy the car I was handling. During the first years I labored under a distributor, but the past year the company established a branch in the territory to take care of the business. While working under the distributor it was a constant fight to get my rights, and I had to scrutinize every invoice carefully, and every adjustment on replacements very carefully, to see that they did not "slip one over on me."

I will recite one instance in particular that I recall. A radiator had gone wrong and I wrote the distributor in regard to the matter and it was stated that the same would be replaced entirely without any expense except the freight or express charges, which I or the customer would have to pay, providing that I would return the one taken from the car. This I did, and when my credit memorandum came some three weeks or so later, I found that they had allowed for the radiator but charged \$15 for "repairs." I ascertained from the home office that the allowance had been made in full, and upon taking the matter up with the distributors again, they "came across." This was one only of many instances.

Although I have been dealing with this company for these years, yet they required a deposit of a hundred dollars last year to show good faith and stated that this amount was exacted from every dealer so as to protect them on parts' account and also for adjustment of commission in case one dealer sold in another's territory. I hesitated somewhat before putting up the money, as no security is given whatever and companies apparently just as well financed have gone bankrupt before and may again.

During the summer I had a customer for a car who promised to buy a little later and terms were practically agreed upon. Relying upon this, I ordered more cars. My party, however, found that he could make a little better deal with another agent in a near-by territory, and the first thing I knew, came in here with a car. I took the matter up with the branch and also the head office, but as the dealer who made the sale sold two or three times as many cars in a year as I did, nothing could be done. They would not collect it and I could not sue for it, for although the dealer had signed up agreeing to divide the commission on any cars sold outside his territory, the company had his agreement and not I, which leads me to ask, how many dealers have studied their contracts over carefully?

If you have, you will find that it is a very much one-sided affair, practically all in favor of the company. All the company virtually agrees to do is to sell the dealer cars at a specified discount and not to establish another agency in your territory providing you work it faithfully.

This year the company is still more ravenous, and insists on a minimum deposit of \$250 and ranging up to \$600 or more. They claim to have four thousand dealers, and figuring \$250 each, the minimum, will make \$1,000,000, which the dealers contribute the use of, free of charge, as no interest is allowed whatsoever. In this manner they do not have any money of their own invested in cars being manufactured, if one figures their output at two hundred cars per day and that they will get returns from cars shipped out in ten days, on the

average. As the deposits of the dealers will average probably \$350 or \$400 each, one can figure that they are getting a still greater benefit than I have named.

It is really amusing sometimes to see that people think any one who has an automobile has just "slathers" of money and does not know the value of it. Even the railroad companies think that the autoist should pay well. Let a dealer order a set of tire chains, a few tools, some repair parts for a car, an inner tube or two, etc., and if the jobber bills it out as "auto supplies," then you would be interested in the freight bill. What rate would it come at? Double first-class. But if the local merchant ordered the same stuff from the wholesale hardware dealer and they billed it out as it should be, "one box hardware," then the freight classification is third- or fourth-class. What should be the difference in classification between a plate-glass wind shield and common, ordinary sash, glazed, both boxed or crated? Or, again, one can ship a car of cattle weighing 22,000 pounds to Chicago for \$92.40, but a car of automobiles not weighing 4,500 pounds will cost \$127.00.

I believe I am in good faith engaged in the automobile business. I really think I am, for I had to carry over several cars, and on account of the reduction in price have lost several hundred dollars, to say nothing of the interest on the money invested in them, and as money is worth ten and twelve per cent. here, it is no small item. In fact, I could loan out as much as I have invested in cars, on good security, at twelve per cent. and a bonus. And then to be asked to advance \$250 gratis for the use of a company that can probably borrow money for four per cent., if not three and one-half, just to show good faith! Of course, they assert that the posit is for protection of dealers on cars sold in another's territory, but, with my experience, I have found that it is not worth the snap of a finger. If they want to pay the commission due, all well and good, but if they don't, you can just "whistle."

As the business grows older and competition is more keen, the requirements of the companies will change, but now we have to submit to most anything they hand us.

Air Compressing.

From Arthur H. Pratt, Pennsylvania.—Referring to article No. 759, page 66, of your January number, I cannot see why H. Gross could not get satisfactory results out of his gas engine for an air compressor providing he made a new cylinder head with about one-eighth inch clearance. Mr. Gross does not state what make of engine he has, but if the engine has the valves in the head and is without side-pockets or valve chambers it would do all right.

I have in use an engine which I converted into an air compressor. This engine has $4\frac{3}{4}$ -inch bore by 7-inch stroke and $\frac{1}{8}$ -inch clearance between piston and head. I made a new cylinder head and used two $\frac{1}{2}$ -inch check valves with close nipple and tee. I run this compressor at 143 R. P. M., and can pump a 25-gallon tank to 100 pounds pressure in four minutes. I have carried it at 141 pounds pressure, but this makes the pipes very hot although the cylinder is water-cooled by thermo syphon system. I made this compressor out of a 7 h.p. single cylinder automobile engine with 21-inch fly-wheel with 2-inch rim and 3-inch face. The engine is placed in a vertical position and bolted to the foundation through the cylinder head. The piston is filled with heavy gas engine cylinder oil in order to cool the piston and oil the connecting rod and crank shaft by splash system.

This compressor has been used in our garage about

one year and seems to fill the bill. I would use larger check valves if I should rebuild. I had the $\frac{1}{2}$ -inch in stock at the time and used them. I think a 1-inch check valve would be about right, as with this size the friction would be much less. This compressor is driven with a 4 h.p. gasoline engine.

Ignition, Lights and Starters.

From Floyd J. Six, Indiana.—Would not All-In-One spark plugs or Two-In-One, be a good kind to use on Ford cars on account of having a pet-cock on the side to blow out the soot by, and also to prime with, as the Ford cars have no pet-cocks in the cylinders?

In O. H. Hampton's letter in the January issue, where he speaks about a simple self-starter, what does he mean where he says to run a wire to string through the dash in convenient reach of the driver, or, what is the shutter lever on the 1911 Holley carburetor?

Will batteries run down on the magneto on Ford cars? I have been using five to start with and it starts better. Some Ford mechanics say it will run down and some say it won't. I know of some who are using them beside myself, and everything goes all right. And will electric light run by the magneto run it down? We have considerable trouble with the carbide lights.

Reply.—We should hardly advise changing the spark plugs for the reason you state. You will find a further elucidation of Mr. Hampton's self-starter in this issue in reply to another reader. The consensus of opinion seems to be that the Ford magneto will not run down from the cause stated.

Guarantee of Tires.

From William Kuhlmann, Texas.—The tire manufacturers have always been extremely liberal in replacing tires said to be defective and that have fallen short of the guaranteed mileage. If I am correctly informed, about one-third of the tires sold are either replaced outright or an allowance on mileage is granted. What this means to the careful user who does not have to make a claim, is easy of demonstration in facts and figures. It simply means that a guaranteed tire must be sold one-third to one-half higher than the unguaranteed article. It also means that only the careless and shiftless tire-user gets full value for his money. But it also proves that a tire of the same quality could be sold for about one-half the present price with this fool guarantee cut out.

Do the reputable manufacturers not tell us that every thread of Sea Island cotton is tested and every ounce of rubber used is of the purest Para kind? That every defective tire is eliminated? That being the case, why can we not get the same tires unguaranteed at their true value?

I believe that in the near future the tire business will be done on the unguaranteed basis, thus putting the burden where it properly belongs. There are now a few concerns who do business on the unguaranteed plan, and it would be interesting to hear from the users of such tires.

Information for Ford Users.

From Subscriber, North Dakota.—I have been selling Fords for the past four or five years and can probably enlighten some of my friends who are readers of your magazine.

One of the most frequent causes of a knock or pound in the engine, when one is satisfied that the bearings cannot be worn, is one of the small wires in the primary wiring getting loose at the point where they fasten to

the timer and touch the case of the timer. There are probably 16 small wires in each primary cable and if only one of these touches the case of the timer it will invariably cause a short circuit and an awful knock or pound. Mr. Ecclestone (743) and Reader (747) would do well to ascertain if this is not their trouble. However, Reader's trouble may be a loose bearing if it is a 1911 car. I have had considerable trouble with bearings working loose inside of fifty to a hundred miles. It was usually the second connecting rod from the front.

I had considerable trouble with the Ford touring cars making a roaring sound, very similar to a horsepower threshing machine, the past season. The sound would begin about 23 miles per hour and end at about 28 miles per hour. As Maynard Strout thinks, so I too thought that it was in the rear radius rods, but I found out differently. It is in the small driving gear on the drive shaft. Some of these gears were made for the company by a parts maker evidently, and they are a little bit "off." Any one who has this trouble can eliminate it entirely by writing the company a letter of explanation and ordering a new gear, and upon return of the old one full credit will be allowed.

I notice that some ask how to wire for electric lights, using the magneto. I bored a small hole, about three-eighths inch, in the dash about four or five inches above where the steering post goes through. Place your two-point switch over this hole with one wire coming from the magneto post of the coil, which is on the front and left side of the dash, to the switch, a short wire about six inches long. The other wire leads from the switch, through the hole you have bored in the dash, down to the hood board, thence along the hood board to which you can tack the wire with double-pointed tacks, to the left lamp; thence under the engine to the right lamp, then with a short piece, about four inches long, ground it to the lamp bracket. Use well insulated wire and any place that is bare or liable to wear off the insulation by abrasion, wind with tire tape. Should it become short-circuited, it would probably "run down" your magneto.

If the front seat of "Subscriber's" car is of wood, he could saw it through on each side and place hinges at the bottom so that it would fold backward and make a bed. It might be a little crowded for two adults and a six-year-old boy, however.

I notice that some are having trouble with Splitdorf magnetos. I had a customer whose magneto gave out on him, and upon taking it off and examining the breaker box, we found that there is a small roller in it, about one-quarter inch in diameter, which was so hard that it wore the shaft upon which it rolled, cutting it so that when the cam came around it would not lift the breaker arm scarcely at all. We turned the shaft over and gave it a new bearing surface and it then worked finely.

Some advocate the use of six-volt lamps with the Ford magneto. I tried the six-volt but after burning out a half-dozen or so, I now procure the eight-volt Mazda tungsten and have good success. They are not real bright at eight to ten miles per hour, but at fifteen to twenty they are fully as good if not better than the acetylene.

You advise Robert Darling (746) that you are inclined to think the trouble is in the ignition. I do not agree with you, for the fact that the car will run until the priming is gone would indicate to me that the fault is in the carburetion.

Many seem to have trouble in starting the Model T Ford in cold weather, but I have had none. I use the Holley carburetor exclusively and find that it will start just as easy, practically, on the magneto as on batteries,

if your vibrators and carburetors are properly adjusted.

I agree with Mr. Covington in regard to the master vibrator and the oil gauge. Once used, one would not be without them.

Mr. Weyrich has, I am glad, found the trouble with his magneto. A customer of mine had about the same trouble and upon close examination found that the two strips between a couple of the field coils had become unsoldered. When going over rough ground, it would cause an awful "miss" and would "miss" more or less all the time.

An Interesting Experience.

From D. W. Pedrick, Pennsylvania.—I have been the owner and driver of motor cars since 1906. There has been a wonderful improvement in automobiles, and now I can say all makes are reliable when kept in good condition. Last summer, early in the season, while down at my summer home at Ocean City, N. J., I purchased an Overland Model 51. I ran that car 3,500 miles and had no trouble. The car handled nicely on the good roads in Cape May County, the sea-side being almost level. In October I brought my car home to Philadelphia and started motoring, but I then commenced to have trouble—loss of power, knocking, etc. Knowing the different condition regarding hills and grades, I took down my motor, expecting and did find lots of carbon, but before taking the motor down, I removed the spark plugs and found only 10 to 15 lbs. compression. After taking off the cylinders and pistons, I found the cylinders scored with little fine scratches caused by carbon, as I had used lots of good light oil, so I concluded to have the cylinders bored, new pistons, heavier and wider rings, and turned the eccentric and had the lap joints lapped in. I put on a new carburetor and ground in the valves. I then put on the gauge and found I had 70 pounds. Now, with five people I can take any hills in our park or surrounding country on high gear, and as fine and quiet motor as possible. I found all the shafts and connecting rods O. K. and needing no adjustment. I made no other repairs than stated. The car is now running 18 miles on one gallon of gasoline and each time I take it out it appears better. I also am able to run on gear as slow as four miles per hour, and feel that I have lots of reserve power for emergency on our city streets. Also, when standing, I can throttle down until it scarcely turns over. The slow running with plenty of power was something I never had on any previous car I ever owned.

I took my cylinders and parts to H. B. Underwood & Company, who carry an advertisement in your publication. I had them do the work in their own way and found they had the appliances, mechanical skill, and experience. I, being a mechanic, reason that you may have the ignition O. K., the bearings all tight, the valves fitting good, but if the cylinders, pistons, and rings are not right, no motor can give out its power anything like intended. The best carburetor cannot work properly if a leaky cylinder cannot take in the required amount of gas and cannot compress what it takes in. From my own knowledge and experience, a great majority of people, when in trouble, will be benefited by looking after this the most important part of their motors.

Making a Sleeping Car.

From E. W., Missouri.—I would like to offer a suggestion to the inquiry in regard to converting the tonneau into a sleeping car. I do not think Mr. New York's idea of iron braces would be practical on account of not being able to fasten the irons to any part of the car that

would be solid enough, and on account of the extra weight. My idea is to put hinges on the backs of the front seats so they can be turned back to the level of the back seat and when not to be used as a bed they can be raised up and bolted in place. Where the coat rail is, put a substitute which will answer as legs to support the backs when down and an additional cross piece to hold the robes and coats. This coat rail and legs will hang down against the backs of the front seats when not in use and will be out of the way. If the backs of the front seats do not reach the back seats when they are let down, instead of the combination coat rail, use a six-inch board that will reach from one side of the car to the other and pull the cushion of the back seat out so it will rest on the board and also support the backs of the front seats. This will make an ideal berth and will not add ten pounds extra weight, and is no trouble to put in place.

Use and Care of Tubes.

From L. C. G., Iowa.—When traveling, carry one or two extra tubes. Then, should one go bad, leave the mending till you get home. If the hole is a large one, sew it up nicely with a needle and thread. Then proceed with the patching and follow directions. Don't be stingy with the cement. Press the patch on firmly, commencing in the middle so to press out all air bubbles. Then put a block on each side and screw it up moderately in the vise and let it stay a few hours; or over night doesn't hurt. In the absence of a vise, put a weight of some kind on it. Though I have had good service from a patch by putting them right in and going on soon as ready, I prefer to let them season. Any cement patch that has been on six months may be taken off and put on again at some convenient time as that seems about the age of the cement. It is more satisfactory to take a patch off and put it on again at some convenient time than to have it come off when one is not ready for it. There is a vulcanizing plant in town and I take all tube mending there.

In getting new tubes, I usually get one-half inch larger size than belongs to the casing. Tubes and casings both vary much in size, and I like to see the tube before I buy. When inner liners are used, one cannot well use an over size tube. I often line the casting with wool carpet. Fit it in nicely and sew with a needle and thread to the thin edge of the casing, which is all the fastening it needs. This largely prevents the tire from heating, and prevents the tube from sticking. Powders that are put in to prevent tubes from sticking will sometimes gather in bunches, harden, and wear a hole in the tube. To carry an extra tube, let the air out, fold up nicely, wrap with a piece of soft cloth, tie loosely and lay in a box. It is better to let it lie flat rather than on the edge. Have some valve cores in the tool box and if the valve fails to hold put in a new core.

I have owned automobiles ten years and have had many of the various experiences that go with them, but the pleasure we get covers it all many times over."

Advice to Ford Owners.

From a Reader, Illinois.—I notice more inquiries in regard to Ford cars than any other one make, and people wonder how it happens. Some people seem to think they have more trouble with the Fords than any other one car; others think because they don't see inquiries about a certain make of car (manufactured by some company that makes only a precious few) that they don't have trouble with that particular car. You find Fords all over the world, and lots of them, and here is

a little advice to the Ford owners: It is, as a rule, hard to start a Ford in cold weather. Put on a different carburetor, and you have a motor that will start easy. Attach a priming cup on the intake manifold, and prime with ether is a sure getaway.

There seems to be quite a bit of trouble with Fords pounding or knocking, of which it is very hard to locate; some have one remedy and some another. I have heard that very same knock when the motor was running idle and speeded up; but put it on a hard pull and she would take life as easy as a lap dog. If you will notice, it seems to be in time with the cam shaft, and the motor being in bloc, it is a hard proposition. I took a Ford down three times before I found it, after asking advice from everyone I knew that had a mechanical turn of mind what was wrong. Everyone had a different idea, and if I had taken all of their advice, I would be running another car today. I wrote the Ford people, and they specified some remedy they thought was good, but of no avail.

Anyone knows that it is no-kid's job to tighten the bearings of a four-cylinder motor. One will examine a motor and pronounce it O. K., no lost motion as they can find. Scrape the carbon off, reassemble, crank her up, thinking she will run like a sewing machine, but to their horror, the same old sound. Yes; I have been right there with the goods. But if they had loosened the main bearings, taken out a brass shim or two, tightened one at a time to a desired tightness, looked about the connecting rod bearings, put her together, cranked her up, no disagreeable sound would have occurred. It takes only a very little wear to make a knock in a motor, and it takes an expert to locate it.

The fans on the Fords with the spring tension are noisy at fast speeds, which is likely to be taken for something else; to remedy, place a washer behind the fan bracket larger than the shoulder on the bolt and tighten.

Taking Care of Tires.

From L. C. G., Iowa.—It does not matter so much what make of tires you buy, there are many good makes. In buying a car, choose one with large tires for the load carried, other things being equal. Of course the tires will be on the wheels all right when you get it, but the time will come when you will have to take a tire off. In replacing, see that it is on right. See that the tube is not twisted or caught under a tire bolt (if they are used). Then inflate properly. I fill them so that when standing on the floor they will not flatten any with the ordinary load on the car. Tires used in the country give out first on the sides from running in ruts, and there is where they suffer when not properly inflated. Am not much in favor of tire protectors for country use, but for city use, where the tires wear out on the face first, then a protector will be of good service. A protector makes the wheel heavier and run harder (on dirt roads) and picks up the dust far worse. Two and one-half second-class tires can be had for the price of one first casing and protector; so I think one will get even more miles for his money using second-class tires.

There is a first-class casing hanging in the garage that traveled less than 240 miles when the whole face came off and now to get any more out of that casing will have to spend about 35 per cent. first cost on it to have it retreaded, and would that be advisable? When that tire gave out, I could not get a first on short notice, so took a second, at three-quarter the price. It has traveled more than 2,600 miles with no noticeable wear.

When my car comes in to the garage, if to stay more than an hour, it is raised off the tires with four jacks

for that purpose. If a casing gets "snagged," have it vulcanized. I have had poor success using tire preparations for that purpose. The garage floor is cement. Under where the car stands when in there is a hole left in the floor about 2 x 7 feet that is filled with coal ashes. Any drip from the car goes in that, and if it gets too dirty, I take out some of the ashes and put in new. This keeps all grease and dirt off the tires. Light and heat are detrimental to rubber, so I keep the garage dark and cool, and this is also better for the varnish on the car. I avoid letting the car stand in the sun as much as possible. When off fishing, picnicing, etc., take a cover along and cover the car if it cannot be gotten in the shade. When winter comes and the car is not used for a time, let some of the air out of the tires, just enough to relieve the strain on the casing. Some prefer to take them off, but when a casing is once stuck fast to the rim I let it stay till it has to be taken off. I have had some blow-outs in casings vulcanized, but find when one blow-out occurs there are other points in that casing that are not much better. Always carry some blow-out patches, and if needed they will take you home. Though I sometimes have an extra casing at home I never carry one with me, for it always seemed an advertisement against a car for one to carry five tires to keep four wheels going. Blowouts are what use up my casings, and they come with about two years' use. Last fall there were two casings that were near the blow-out age. I got some inner liners and put in them. They add some weight and make the tires less resilient, but think they will prolong the use of the casing.

For a Heating Transmission.

From O. H. H., Indiana.—Planetary transmissions with constricting bands for applying slow speed or reverse gear, frequently get heated on account of the bands being too close a fit on the drums, or from sticky oil leaking out of the drums, and dirt or gravel sticking to them. When not in use, the bands should hang entirely free from the drums or they will heat the transmission, and the friction will also absorb more or less of the power of the motor.

If the high speed gear is brought into use by pressing two disks together and the disks slip on each other instead of holding fast, there will be friction there that will cause heat. If Mr. Hinkle (740) will look after these two probable causes of the heat and see that they are correctly adjusted, it is almost certain that the heat will cease.

For Rattling Radius Rods.

From A. T. Van Nostrand, New York.—If Ford owners are troubled with rattling front radius rods at the ball joint, on the fly-wheel case, let them take a piece of sheet-iron about 1½ inch diameter, and with a ball peen hammer form it down into the lower cap, file off the ends or corners level, put back on and try it out. Don't try to fit it into the round too close. Allow a little for spring. Galvanized iron is best.

Camping With a Car.

From H. C. N., Illinois.—If "A Subscriber" will send a stamp to the Franklin Automobile Company, Syracuse, N. Y., he will receive a neat illustrated booklet, "Six Weeks in a Motor Car, Camping and Sleeping Out," describing the camping and touring equipment built and used by the writer and his wife in their delightful outing last summer. Doubtless other readers are heeding the loud call of the out-of-doors.

Starting by the Carburetor.

From LeRoy Fish, New York.—In my January issue I noticed an article on starting devices, by O. H. Hampton. I would like more detailed information in regard to the device that starts with gas from the carburetor. He mentions drawing gasoline from the tank through a carburetor. I took it from that that he has a separate carburetor for that purpose only and does not take gas from a carburetor that is connected to the motor.

I have a distributor and pump, and take gas through the motor carburetor. All pipes are $\frac{1}{8}$ inch copper lamp tubing. There are check valves on the engine, etc., but I do not get results. Now I am wrong somewhere and would like you to help me out. I have an idea my suction pipe from the carburetor to the pump should be larger so as to get quicker suction on the upstroke of the pump. I would like more information as to arrangement of the pipes, sizes, etc. My distributor runs from an overhead cam shaft on Jackson, 30.

Reply by Mr. Hampton.—Mr. Fish's supposition that a special carburetor is used for the starter described in the January number is correct. The pump, operated by hand, draws gasoline and air through the carburetor and forces the mixture through pipes from the pump into the cylinders. The inventor of the device has abandoned all of it except the pump, carburetor, and pipes; probably because of the difficulty in attaching the rest of it to motors not built with special reference to making the attachment. Mr. Fish does not say; how nor where his starter intake pipe is attached to the carburetor of the motor. Presumably, it is attached to the motor intake pipe between the carburetor and the first branch of the intake manifold. His device for charging or priming the cylinders is practically the same as that used by the motor for charging itself when it is running, except the size of the parts. The size of the motor intake pipe is probably one and one-fourth inches, and its area 1.2272 inches. The diameter of his starter intake pipe is $\frac{1}{8}$ inch, and its area .01227 inches, which is about 1/100 of the area of the motor intake pipe. The $\frac{1}{8}$ inch pipe is too small to have any appreciable effect on such a large carburetor. Therefore, the device does not work, and it is impracticable to use a starter intake pipe and pump large enough to fit the carburetor.

If Mr. Fish is fond of experimenting, we would suggest that he get a half-inch carburetor, attach it to the gasoline tank in the usual manner, and attach it to the pump by a half-inch pipe, and have the pump of ample diameter, say two and one-half or three inches. There must be a check valve in the bottom of the pump. Attach pipes leading from pump to cylinders, making the attachment at one side of the pump as low down as possible not to interfere with the action of the check valve in bottom of pump. It is preferable, but not actually necessary, to have a check valve to prevent any back flow of gas from the pipes to cylinders, as check valves are provided at the entrance to cylinders.

A suitable brass casting can be made with openings for the attachment of intake and outlet pipes, and shaped for the reception of the check valves, and also an opening in the top into which to screw the lower end of the pump barrel. The upper end of the pump barrel may be closed by a screwed-on cap, and if the power plant is not in the way, the pump can be placed with its top flush with the toe board, in which case the top of the pump should be flanged so the flange resting on the floor will support the pump.

The pump may, of course, be located wherever there is room for it, convenient to the driver's hand. Adjust

the carburetor so the mixture will be rather rich because a rich mixture explodes easier.

In operating, the up-stroke or pulling stroke, will be the pump filling stroke. Make this stroke very quickly, pulling to full height and holding it there until the vacuum is filled. By operating the pump quickly, there is a greater suction through the carburetor and consequently better carburetion.

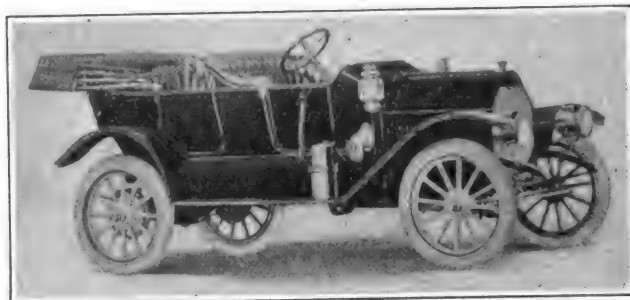
Make the down, or injecting stroke, quickly also, for it is probable that one of the motor exhaust valves is open, and in that case the gas injected into that cylinder can pass freely into the motor exhaust pipe, and if the injecting stroke is made slowly practically all the gas would escape through the open exhaust valve, but if the pipes are small, and the stroke made quickly, the strong pressure will force a sufficient part of it into the proper cylinders.

If everything is in proper order, and any one of the cylinders is in the firing position or near enough to it to have both valves of the cylinder closed, the motor will start on the spark after using the pump. In cold weather and the engine cold, it will probably be best to inject the starter charge and then get out the old crank and spin the motor. It is a fact that when the motor is running, this device will assist in supplying the motor with gas. Its operation will be precisely the same as that of the regular carburetor and intake valves.

SOME MEDIUM PRICED CARS.

All Five Passenger, High Grade, and They Sell for from \$900 to \$1200.

Those who are looking for up-to-date touring cars that will carry five passengers and which sell for a low price, considering their high grade, will be interested in the following specifications and illustrations of 1912 cars:



Model, Maxwell Mascotte Touring Car. Price \$980 (Top Extra).

Specifications.

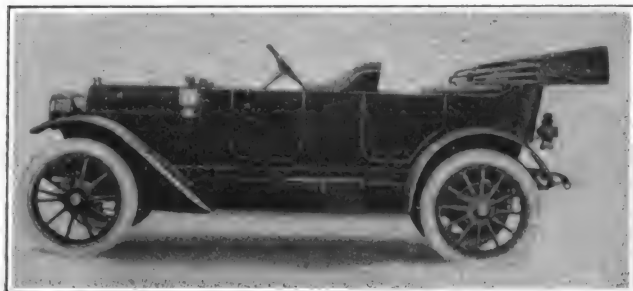
Color—Body, blue-black; wheels, battleship gray.
Seating Capacity—Five persons.
Clutch—Multiple disc.
Wheel Base—104 inches.
Gauge—56 inches.
Tire Dimensions—Front, 32x3½ inches; rear, 32x3½ inches.
Brake Systems—Contracting and expanding on both rear wheels.
Horsepower—25.
Cylinders—Four.
Arranged—Vertically, under hood.
Cast—In pairs.
Bore—4 inches.
Stroke—4 inches.
Cooling—Water.
Radiator—Honeycomb.
Ignition—Jump spark.

Electric Source—Low tension magneto and dry batteries.

Drive—Shaft.

Transmission—Sliding gear.

Gear Changes—Three forward, one reverse.



Model, Courier "Clermont." Price \$1150 (With Full Equipment).

Specifications.

Color—Dark blue with white stripes.

Seating Capacity—Five persons.

Clutch—Multiple disc.

Wheel Base—108 inches.

Gauge—56 inches.

Tire Dimensions—Front, 32x3½ inches; rear, 32x3½ inches.

Brake Systems—Contracting and expanding on both rear wheels.

Horsepower—30.

Cylinders—Four.

Arranged—Vertically, under hood.

Cast—En bloc.

Bore—3¾ inches.

Stroke—5⅞ inches.

Cooling—Water.

Radiator—Vertical tube.

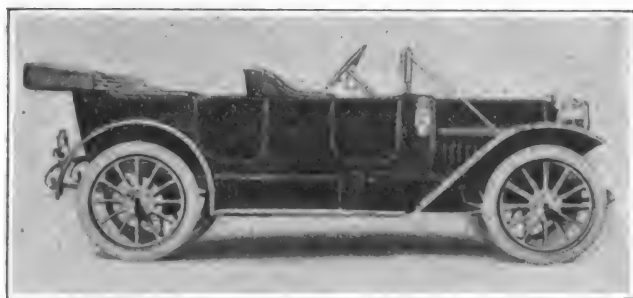
Ignition—Jump spark.

Electric Source—Magnet and dry batteries.

Drive—Shaft.

Transmission—Selective sliding gear.

Gear Changes—Three forward, one reverse.



Model, Oakland "Thirty." Price \$1200; With Top, Windshield and Speedometer, \$1290.

Specifications.

Color—Golden brown or body, gray or blue; running gear, black.

Seating Capacity—Five persons.

Clutch—Cone.

Wheel Base—106 inches.

Gauge—56 or 60 inches.

Tire Dimensions—Front, 34x3½ inches; rear, 34x3½ inches.

Brake Systems—Contracting and expanding on both rear wheels.

Horsepower—(A. L. A. M. rating) 25.6.

Cylinders—Four.

Arranged—Vertically, under hood.

Cast—In pairs.

Bore—4 inches.

Stroke—4 inches.

Cooling—Water.

Radiator—Tubular.

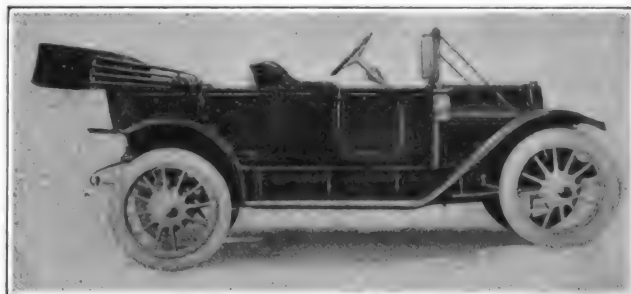
Ignition—Jump spark.

Electric Source—Low tension magneto and dry batteries.

Drive—Shaft.

Transmission—Selective sliding gear.

Gear Changes—Three forward, one reverse.



Model, Overland 60 T. Price \$1200; With Cape Top and Windshield, \$1225.

Specifications.

Color—Body, Overland blue; running gear, gray.

Seating Capacity—Five persons.

Clutch—Cone.

Wheel Base—114 inches.

Gauge—56 inches.

Tire Dimensions—Front, 34x4 inches; rear, 34x4 inches.

Brake Systems—Contracting and expanding on both rear wheels.

Horsepower—(A. L. A. M. rating) 27.2.

Cylinders—Four.

Arranged—Vertically under hood.

Cast—Separately.

Bore—4⅞ inches.

Stroke—4½ inches.

Cooling—Water.

Radiator—Honeycomb.

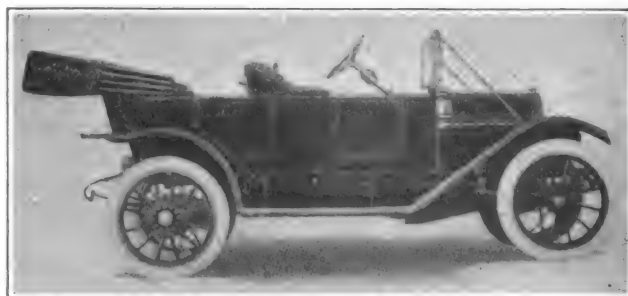
Ignition—Jump spark.

Electric Source—High tension magneto and dry batteries.

Drive—Shaft.

Transmission—Selective sliding gear.

Gear Changes—Three forward, one reverse.



Model, Overland 59 T. Price \$900; With Cape Top and Windshield, \$950.

Specifications.

Color—Overland blue.

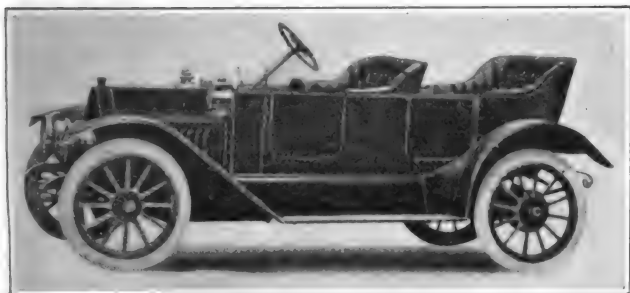
Seating Capacity—Five persons.

Clutch—Cone.

Wheel Base—106 inches.

Gauge—56 inches.

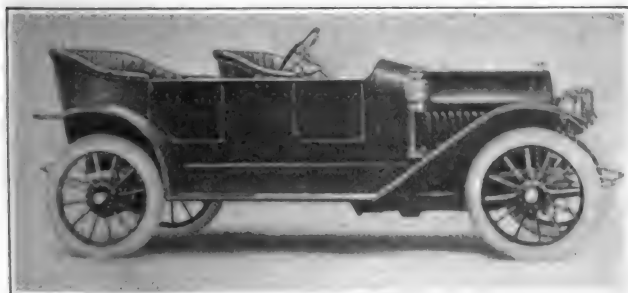
Tire Dimensions—Front, 32x3½ inches; rear, 32x3½ inches.
 Brake Systems—Contracting and expanding on both rear wheels.
 Horsepower—(A. L. A. M. rating) 25.6.
 Cylinders—Four.
 Arranged—Vertically under hood.
 Cast—Separately.
 Bore—4 inches.
 Stroke—4½ inches.
 Cooling—Water.
 Radiator—Honeycomb.
 Ignition—Jump spark.
 Electric Source—High tension magneto and dry batteries.
 Drive—Shaft.
 Transmission—Selective sliding gear.
 Gear Changes—Three forward, one reverse.



Model, Buick "Thirty-five." Price \$1060 (With Full Equipment).

Specifications.

Color—Body, hood, fenders and chassis, blue-black; wheels, Buick gray.
 Seating Capacity—Five persons.
 Clutch—Cone.
 Wheel Base—102 inches.
 Gauge—56 or 60 inches.
 Tire Dimensions—Front, 32x3½ inches; rear, 32x3½ inches.
 Brake Systems—Contracting and expanding on both rear wheels.
 Horsepower—(A. L. A. M. rating) 22.5.
 Cylinders—Four.
 Arranged—Vertically, under hood.
 Cast—In pairs.
 Bore—3¾ inches.
 Stroke—3¾ inches.
 Cooling—Water.
 Radiator—Vertical tube.
 Ignition—Jump spark.
 Electric Source—Low tension magneto and dry batteries.
 Drive—Shaft.
 Transmission—Selective sliding gear.
 Gear Changes—Three forward, one reverse.



Model, Jackson "Thirty-two." Price \$1100; With Mohair Cape Top, \$1175

Specifications.

Color—Brewster green.
 Seating Capacity—Five persons.
 Clutch—Cone.
 Wheel Base—110 inches.
 Gauge—56 inches.
 Tire Dimensions—Front, 32x3½ inches; rear, 32x3½ inches.
 Brake Systems—Contracting and expanding on both rear wheels.
 Horsepower—(A. L. A. M. rating) 25.6.
 Cylinders—Four.
 Arranged—Vertically under hood.
 Cast—In pairs.
 Bore—4 inches.
 Stroke—4 inches.
 Cooling—Water.
 Radiator—Honeycomb.
 Ignition—Jump spark.
 Electric Source—Low tension magneto and dry batteries.
 Drive—Shaft.
 Transmission—Selective sliding gear.
 Gear Changes—Three forward, one reverse.

A Timely Word of Caution.

From H. Van Ruschen, South Dakota.—While the article headed "Repair and Running" in the February issue, is instructive and gives many valuable pointers, I believe the paragraph on glass "bombs," prepared by mixing lime and water and describing the effects of same, might better have been omitted, for just as sure as some kid reads that formula, he will try it and when he does, he will probably select some broad, smooth highway for his experiment "and in a very short time, the strongest bottle will burst with a heavy report, sending a shower of glass and lime in many directions," and just think what that would mean to the joy-riders. As it is now too late to keep the offending paragraph out of print, I am going to put my copy of the paper away where I shall not even see it myself, to avoid the mischief I have alluded to.

Quick Rural Mail Delivery.

From O. H. H., Indiana.—Bert Lacey has a rural route mail delivery out of Fountain City, Ind. The route is 24 miles long. There are more than 100 mail boxes on the route, and in addition to delivering and collecting the first-class mail he delivers 100 daily newspapers, so there are always more than 100 stops to make. The writer recently timed his trip unknown to Mr. Lacey, and it was exactly three hours from the time he started from the post-office until he was back again. When using a horse for the same work it took from five to six hours.

Good for the Ford Car.

From A. G. McCord, Ohio.—We have driven a Ford Model T nearly two and one-half years and had it in a garage but once for repairs. Have kept it in shape ourselves and have always found relief in time of trouble by remembering hints and suggestions read in your valuable magazine.

Satisfactory Starting.

From W. B. L., Maine.—I want to say, for the benefit of those who have trouble in starting this cold weather, that I tried the method of Mr. Bert Poole, as taught on page 77 of the January issue, and "satisfaction reigned supreme."

Sam In More Trouble.

From O. H. Hampton, Indiana.—Hello Sam; got any more troubles to unload? I am ready to hear them."

"Well, yes," said Sam, "had right smart of trouble day before yesterday. I undertook to drive a traveling man on a trip. We had finished half the distance and got within a mile and a half of Bloomingsport and were on fine road and a fierce wind at our backs. The old machine was going fine, and as it was about noon we had begun to think about the good dinners the Lynn hotel serves and that we would be there just about the right time of day, when all at once the engine set up a racket that reminded me of the "rattler" in a foundry, and in about ten seconds it stopped with a chug that locked everything solid. There was nothing to do but take the engine apart and find the trouble.

"There was a house near by and I told my passenger we had better go there and 'phone the Lynn livery barn to come after him, as it was plain there was going to be a lot of delay and the machine would probably have to be towed home.

"He said, 'not much; I am going to stay right with you. I am not in a hurry and if I was, I am not going to desert a partner in trouble.'

"We got to work and took the engine down and found the trouble. A piece of Babbitt metal had broken out of the crankshaft bearing. It was about the size of a half dollar and twice as thick. It had somehow got between the cam shaft gears, and had done things a plenty. The large gear wheel was of rather light construction and where it had pinched the piece of Babbitt, its circumference was mashed in so its teeth could not reach the teeth of the other wheel. Nothing more to do but put the engine together again and arrange for somebody to tow us in.

"We had just got ready for a tow when a man came along in a buggy. I explained things and offered to pay him if he would tow us into Bloomingsport. He said he didn't think he had time and asked what I would give him. I told him that as it would not take him more than half an hour, it would not be worth more than fifty cents. He said he didn't care to do it for less than a dollar. I said it was not worth any more than I had offered him and my passenger told him that a horse and buggy could be hired a whole day for a dollar and a half. The fellow retorted: 'Well, I know that but you are in a fix. You have got to get somebody and I don't care to do it for less than a dollar.'

"Then I lost my temper just a little bit and remarked, 'you are trying to kick a man that is down, and that is about the meanest trait in human nature.'

"Just then my passenger said, 'Yonder comes an auto, so we turned our backs on the chap in the buggy, but he still sat there. I suppose unable to leave the possible prospect of getting a dollar for fifty cents worth of work.

"I didn't care a rap about the dollar the fellow asked. It was the contempt I had for a creature in human form who was trying to take advantage of another man's misfortune that set my bile to fermenting. The car came up to us; it was a big, sturdy, 40 horse power machine and the driver looked as sturdy and big as the machine, and an open square deal face on him that any student of human nature would take a second look at. I explained, and he turned that big machine round and backed up to our cripple.

"In ten seconds the tow rope was tied and we

started. I remember that the fellow in the buggy still sat there, hoping against hope, I suppose, that something might still happen that would put that dollar in his hands. The tow to Bloomingsport was done in four minutes. The big machine was whirled round like a baby wagon and went on its way, the driver scouting the idea of taking a cent of pay for his service.

"His name is Wilbur Longnecker and if you ever run across him, go right to him and shake hands with him and tell him Sam will never forget his kindness and good fellowship the day he towed Sam into Bloomingsport.

"At Bloomingsport there is a big blacksmith named Lem Chamness, as fine a sample of physical manhood as will often be seen, and he is a fine man in every respect, besides being an unusually good mechanic. I told my troubles to Lem, and he said he didn't know whether he could do anything with it but was willing to try, so we went at it. He heated that bent and twisted gear wheel, and straightened it out and dressed the battered gear teeth till it looked almost as it did before, and it worked all right too. It has been working right ever since."

THE REPAIR SHOP.**Some of the Tools to use and How to use and Care for Them Properly.**

The charm of a car owner's workshop depends upon the fact that it develops along with his own development in mechanical skill. Beginning with a spanner or two, a file, and a pair of pliers, it may end in a shop fully equipped, with power tools; but in the very large majority of cases it stops just short of the lathe stage. And for the reason that these earlier stages seem somewhat of a neglected subject, it may be of interest, and, to the novice of profit also, if we consider how one's workshop and one's skill develop, or may be expected to develop. For the ordinary mechanical adjustments about the car certain tools are, of course, necessary, and usually these are carried on the car, but as they form the foundation of the workshop equipment we must review them before proceeding to the workshop proper and the extra tools to be found there.

The necessary tools are somewhat as follows: Special spanners for valve caps, hub caps, etc. (generally supplied with the car), one large shifting spanner, two small ones (or one small one and a set of wrenches or box spanners fitting the smaller nuts), two pairs of combination pliers, gas pliers, a couple of punches, a chisel, a light cross-pene hammer, and two or three screwdrivers. One pair of combination pliers may be replaced by a hand vise, but my own experience shows the pliers to be more widely useful.

These tools will cost from \$3 to \$5. The hammer should feel comfortable and well balanced in the hand, and hammers differ curiously in this respect; the boxful the hardware clerk brings out will be found to contain two or three excellent ones from which a choice can be made. Pliers, when gripped tightly in the hand, should feel solid, without "give," and the jaws should meet closely and squarely at the top. It is well to avoid those having emergency screwdrivers or the like formed on the ends of the handles, as they hurt the hand.

Screwdrivers that have oval handles afford a com-

portable and firm grip, and those made specially for motor work should be preferred, as they are more substantial than those made for joiners and others. Even the small screwdrivers used by motorists have often to perform heavy work. Of the shifting spanners, the large one may be from eleven to fourteen inches in length, and the small ones may be bicycle spanners; sharp curved ends are to be avoided, for the reason mentioned with respect to pliers.

Tools for Garage Use.

Coming now to the tools more properly for workshop use (that is, the tools it may be desirable to have for use at home, but which will rarely be carried or needed on the road), probably the next purchase will be files, and a heavy ball-pene hammer. The hammer should be chosen for comfort and balance. Heavy blows, accurately placed, cannot be delivered unless the hammer be well balanced. The files are an inexpensive item; a dollar or two puts one in possession of a six-inch flat, bastard cut, six-inch half-round, second cut, and six-inch round, together with their handles. These will suffice for most of the small jobs a man will do on his car.

As soon as the repair man begins to file, however, he will feel the need of a vise, and at this point it might be advisable for him to consider to what lengths his taste for mechanical work is likely to lead him. If he believes the merest running repairs will satisfy his cravings, a small vise clamped on a firm shelf in the garage will serve his purpose. If, on the other hand, after a year or two he finds himself—as many men do find themselves—interested in the mechanical work on the car and wishing to make little improvements and alterations here and there, it will be worth while for him to arrange a little workshop, with a firm bench in a favorable light, and to have a larger vise. The bench cannot be too firm and stable; it may, if space permit, be 6ft. long by 3ft. wide, and it should be of such a height that the top of the vise jaws will come to the level of the elbow.

The Choice of Files.

In his early attempts at filing the novice will use on any metal the first file that comes to hand, sawing backwards and forwards with equally heavy pressure, but he will soon discover that a file cuts on the forward stroke only, and that if he relieves the pressure on the backward stroke he will save his strength, and the teeth of his file also. Later on, he will buy 12-inch files, and be particular as to the uses to which they are put; but even from the first he should not use good new files for solder, and should keep a sharp fine file for brass. Even later still, and then only if he do a great deal of filing and essay first-class work, he will make another discovery—that to file well is, perhaps, the most difficult accomplishment with hand tools ever asked of a mechanic.

When choosing a file, it should be balanced on one finger midway of its length, and lightly struck with some hard body. If the file be good it will “ring” almost as though it were a tuning fork. It should then be held nearly level with the eye, the light falling obliquely up its teeth, which should present a perfectly regular and even-appearance viewed from either end. The color should be an even dull, silvery grey, free from spots or mottling—except, of course, at the tang, where it is tempered. Files should be kept in a rack by themselves, and must not be thrown in a drawer among other tools, and if a file or two be carried on the car, let them be separately wrapped in thick brown paper to save their teeth from injury.

Tin-snips and Hack-saw.

Possibly the next work after filing that will present itself will be cutting metal. A pair of tinsmith's snips for thin sheet metal are handy. For thick metal, rods, etc., a hack-saw is required. The hack-saw is an inexpensive and most useful tool, a frame taking 8-inch blades should be had, the more expensive ones adjusting the tension of the blade from the handle end. This kind is preferable to that which adjusts by a nut at the other end, as a hack-saw is sometimes used in awkward corners on the car itself, and the wing nut is liable to get in the way.

The blades cost little by the dozen and cut anything that can be filed, but being very hard are consequently very brittle and easily snapped. A dozen, however, should last a careful amateur a year. Like the files, they cut in one direction only—on the forward stroke. Even on the working stroke the pressure should be light, though not so light as to allow the teeth to jump, or they will break. The strokes must be slow, and one should endeavor to use the full effective length of the blade on heavy work.

Selection of a Soldering Iron.

A soldering kit finds a place in even the smallest workshop, and soon saves its cost, to say nothing of the little domestic jobs that find their way down to the work-shop—jobs, by the way, which should not be refused, as they are quite good practice. The kit consists simply of a soldering iron, hard tinman's solder, and some flux.

As a small iron loses its heat very quickly, a medium weight iron should be chosen; and as the success of the work depends in a large measure upon the quality of the copper, which is the business part of the “bit,” the cheap soldering sets are better avoided.

The purpose of a flux, of which several are in use, is twofold. It prevents the metal from becoming oxidized, and helps the flow of the solder. Perhaps the flux most commonly employed is chloride of zinc, usually called acid. It is made by immersing zinc clippings in hydrochloric acid till effervescence ceases—taking care, by the way, not to inhale the fumes. It may be diluted with water, and some prefer to add a few crystal of salammoniac. For electrical work a non-corrosive flux is necessary, such as resin, or some commercial non-corrosive flux.

Tinning the Soldering Iron.

The first process in soldering is “tinning the bit;” that is to say, coating its point with solder. The bit is heated (in a blow-lamp or clear fire) a little more than necessary to melt solder, quickly taken to the vise and the point filed bright for about an inch, dipped in the flux a moment and then rubbed on the solder, a bright silvery coating of which will adhere to the point where it has been filed and dipped in the flux. The bit is now ready for use. It should always have this bright silvery appearance when soldering, or it will not do its work properly.

After the soldering bit has been heated, it should be quickly wiped on a piece of clean rag or waste before applying it to the work; if it look dull or greasy, and a dip in the flux does not restore its brightness, it has probably been overheated and must be retinned, care being taken to file off all the old burnt solder right down to the soft copper. The parts to be soldered should be cleaned by scraping, filing, or with emery cloth, and may have a coating of flux applied at once. They must not be touched with the hands. Given a good iron, the two main points in soldering

are—(1) having the work perfectly clean and free from grease, and (2) holding the iron on the work long enough to heat the latter sufficiently for the solder to flow.

Preparing the Work.

Tin, brass, and copper solder readily, but steel and iron frequently have to be tinned, and indeed for large and important joints on copper and brass it is safer to tin the parts. The method is thus: With care, cleanliness, flux, persuasion, and a warm iron, solder is induced separately to coat each part of the joint to be soldered, the superfluous solder being wiped off with a clean rag, leaving a bright clean coating of solder. The parts are placed firmly together, flux is applied and then the iron, with as much more solder as may be required. For soldering aluminum special flux and solder may be obtained.

(To be concluded.)

MOTURING AND HEALTH.

Good for Anaemia, for the Nerves and for Insomnia Also For Social Well-Being.

Undoubtedly motoring is a pastime of the greatest benefit to our physical and social well being, and I can trace quite a large number of benefits to it which are entirely beyond question. Indeed the improvement in the health of my patients and acquaintances has often been so marked as to make it a very interesting, not to say instructive, proceeding to endeavor to analyze the reason. To generalize, one might remark briefly that motoring is a form of fresh-air treatment to which must be added the unique exhilaration arising from fast travelling. Moreover, one must not forget the rapid change of scene nor the piquancy given by the rapid unfolding of the panorama, the key to which lies in the possession of the modern car.

Now it is easy enough to assert that a swift rush through the air is a splendid energizer of the human frame, but to grasp the underlying causes needs a little thought. To my mind the main reason is to be found in the physiological fact that the circulation is stimulated by the increased pressure of the wind acting on the body, the effect being enhanced, moreover, by variations in its force. And the same remark applies equally to the respiration, as we insensibly breathe more rapidly. Equally with massage this fresh-air tonic braces up the system, invigorating and enlivening us till even our faces bear witness of the remedial work going on within. The cheeks at first take on a slightly whiter tinge, owing to the little blood-vessels of the skin being somewhat constricted, the color deepening a little later to a healthy flush as the vessels become enlarged in their response to the oxygenating agent. This quickening of the blood affects the brain also, and as this organ is quick to feel the consequent stimulation, it, too, assists in the rejuvenating process. So unusual a quantity of oxygen in the system has the happy result of banishing depression and moodiness as well as soothing nerves, strained, it may be, beyond their endurance by the stress of modern life.

And the best of it is that one can enjoy motoring at one's leisure, for it differs from most sports in that one reaps the benefits without having to exert oneself unduly. Indeed, I am positive from facts coming under my purview that the average pastime is too strenuous to be beneficial, even in the case of the young, while it is altogether unsuited to the middle-

aged. Nor must we forget the attraction of the car for people who otherwise would spend their time indoors. To them the car comes as a friend, obedient, appealing to the best in them, and not only a friend but a kindly physician, as it keeps at arm's length the dread results of an enfeebled stamina.

To see "the wheels go round" is a desire every bit as strong in adults as in the little boy and many a man (and woman too, so far as that goes) has unearthed a hidden talent that transforms his leisure into a period of delightful education. It needs but a few weeks of this remedial treatment to change the *blasé* and unsatisfied person into one for whom a fresh page has been turned, and the cold machine of chill steel and mysterious mechanism becomes instinct with life and pleasure.

That change of habit is beneficial has long been recognized by medical men, and it is here that the car has proved so kindly. Think, for example, the freedom one has. A longing for fresh scenes and pastures new seizes one suddenly, overtaxed nature demanding relaxation from mundane affairs. Instantly the whim can be gratified, and one can give free rein to that nomadic spirit that is inherent in most of us. And the sense of freedom is enhanced by its brother in arms, welcome anticipation, and as the car speeds onward one learns to watch with interest what the road unfolding before us will reveal. Sweeping up long inclines, gliding down a sinuous hill, with, it may be, lofty eminences on either hand or a fair smiling plain around, our pulses leap in unison, and we taste the joys of unfettered life. Anon, quaintly built cottages, far from the madding crowd, come into view, while majestic architecture and flowing wold, hitherto unattainable, are brought to our feet.

One of the most direct and noticeable results of motoring is its power of curing insomnia. The ground being prepared beforehand by the soothing process the nerves have undergone, the gentle exercise of certain faculties, combined with the calling into action of others, induce in the system a healthy co-ordination and restful fatigue—if I may use the Irishism—that predispose one to recuperative slumber. Insomnia is, alas, only too common, as we medical men are aware, and is nearly always due to activity of the brain. Now this organ, being beyond our direct control, frequently prefers to go on working even when we have put our bodies to rest, and the very inactivity of the latter seems to cause the mind to exert superhuman energies. For cases of this sort I know of no better cure than motoring, and have prescribed it times without number, and invariably with success.

Yet another common ailment in which motoring is of great benefit is anæmia, whether idiopathic or occurring during convalescence from an acute illness. The advantageous effect is obviously brought about by the increased amount of oxygen absorbed from the air, the large amount of time spent in the sunlight, and the improvement in the appetite. Enlarged glands, either scrofulous or tubercular, are likewise reduced in size, and eventually disappear. It is a well-established fact that fresh air and sunlight are inimical to many germs. Advantage is taken of this fact in the open air treatment of consumption. It is therefore not surprising that motoring has proved to be a useful agent in the treatment of germ-produced diseases, including consumption, asthma, some cases of chronic bronchitis, suppurations, and so on. Not only are the germs lessened in their activity or actually

killed, but the anæmia which they produce is also alleviated in the way mentioned above. Before leaving the subject I may add that dandruff and baldness of the head, produced by germs, I have known in several instances to be decidedly benefited.

Then, again, there are certain mild forms of heart disease which are undoubtedly ameliorated by motoring, due possibly to the enriching of the blood.

It must not, however, be imagined that motoring is a panacea for all ailments, or even that the diseases to which I have referred will invariably be cured. Each must be taken on its own merits, and the *pros* and *cons* carefully weighed before making any definite statement. One can, however, say that, looked at from the broad point of view, motoring is undoubtedly healthy and health-giving, and that in certain classes of diseases it has afforded us an additional method of treatment of an extremely promising nature.

DRY BATTERIES.

Life of the Cells and How to Care for and Test Them.

Charles M. Warren in Ignition.—When buying dry batteries insist on having new, fresh cells, as any battery depreciates in value with age. Never take a cell without testing, as it is the practice of dealers to work off their old stock on unsuspecting customers. Examine the battery closely for the makers' dates, and if the battery is several months old, it is probable that the electrolyte is dried up, or that the electrodes are wasted through long continued local action.

As heat stimulates the chemical action in cell and causes it to waste fast, dealers should store cells in a cool place to retard the action as much as possible.

Under all conditions the cells should be kept dry, as moisture deposited on a battery forms a closed circuit for the current. This drain upon the cell is due to the closed circuit formed by the moisture and hastens the end of the useful life of the cell.

Cold retards chemical action, and consequently excessive cold will lower the output of the battery. If the electrolyte is frozen the generation of current will be suspended until the battery is warmed up by some means. Difficulty in starting during the cold weather is sometimes caused by cold batteries. If you find it difficult to start your engine in cold weather, investigate the battery.

Multiple cylinder engines exhaust a battery quicker than those with a single cylinder, as there are more current impulses in a given time, and consequently more current is used. A battery may be compared with a bottle that holds a certain quantity of water. If the water is allowed to drip out a drop at a time it will last for a long period, but if allowed to flow in a continuous stream will soon be emptied. A battery contains a definite amount of current good for a definite number of sparks. The length of time that elapses before the battery is emptied depends on the rate at which the current is used.

With badly designed or poorly adjusted spark coil, the demand on the batteries is greater than with one that is in proper condition. An engine that runs continuously exhausts a battery faster than one that is run at long intervals. Always open the battery switch when the engine is to be idle for any length of time, as the engine may have stopped with the ignitor in contact, allowing the battery to expend its energy uselessly.

Test batteries after standing a while, as the bat-

teries will recover after standing a while, and will show a fictitious value.

A weak, partially exhausted battery will cause a poor spark that will result in misfiring or a loss of power. It is poor economy to attempt running an engine on a weak battery. An engine may run on a weak battery for a short time, and then gradually decrease in speed until it comes to a full stop. Misfiring is generally in evidence as the engine dies down. In case of an emergency, weak batteries may be made to run an engine of an automobile or boat to its destination by stopping the engine frequently and allowing the batteries to recuperate during the idle periods. A battery that is temporarily weakened by hard service or by a temporary short circuit will usually revive or partially recover its strength if allowed to "rest" for a short time until the hydrogen is absorbed by the depolarizing material. The life of a dry cell can be extended for a few hours by punching a hole in the sealing wax on the top of a battery and pouring water or a solution of sal ammoniac and water into the cell. This will reduce the internal resistance and increase the amount of current for a short time. The batteries run under these conditions are good for a short time only, and new cells should be procured at the earliest possible moment.

The method of recharging is a make-shift to be resorted to only when out of reach of the battery dealer. No worn out cell can be made as good as new by any method. If your engine slows down, misfires or stops, do not overlook the condition of your batteries, nor take it for granted that because they were in good condition yesterday that they are necessarily in good condition now.

A short circuit or a closed battery switch may have put them out of commission since you made your last inspection.

If the binding screw on the carbon electrodes is loose or does not make good contact with the carbon, tighten it to reduce the resistance, as a loose screw decreases the output of the battery considerably.

Never drop a battery on the floor nor hammer on it, as severe shocks cause the material in the battery to loosen, which in turn increases the internal resistance and reduces the current. Always fasten the wire, firmly under the binding screw. Never make a connection by carelessly twisting the wire around the screw.

In the absence of an ammeter, a rough estimate of the condition of the cell may be made by fastening a wire tightly in the zinc binding screw, and lightly touching the carbon electrode with the free end.

If when making a contact, a small puff of smoke arises and a small, red spark is observed at the point of contact, the battery will be found to be in good condition.

Sometimes the contact made on the carbon will produce only a black ring on the surface of the electrode. This indicates a battery that is nearly exhausted, and one which is good for only a few more hours of service.

As there is not much difference in voltage between a new and old cell when on open circuit, it will be seen that the ammeter giving the current output will give a more accurate determination of the condition of the battery. The voltage is independent of the size of cell.

The battery showing the greatest amperage is not necessarily the best for general use, as cells having an unusually high current capacity are generally short

lived. The strong electrolyte used in high ampere batteries causes them to burn out or deteriorate rapidly when not in use. Under ordinary conditions, a correctly proportioned No. 6 ignition cell should show a current of from fifteen to twenty amperes on short circuit when the cell is new, although higher results may be obtained safely with some makes of cells.

While the voltage is the same for all sizes of batteries, and depends on the material used in the construction, the amperes increase with the size of the cell, and the area of the electrodes. If a cell does not show more than ten amperes on short circuit, it should be thrown out and another substituted for it, as the cell is liable to go out of commission at any minute when reaching this point of exhaustion.

REPAINTING POINTS.

How the Car Owner May Have the Car Look Well at a Low Cost.

BY M. C. HILICK.

The automobile shows held and being held in a great number of American cities the present season testify not only to the popularity of the automobile, but to the fact that the painting and finishing of the car is one of the important agencies contributing to its popularity.

It is probable that a great many automobile owners, upon returning from the exhibitions referred to, will feel an increased interest in the appearance and general finish of their cars, and the ultimate result will be that they will either take the cars to the carriage painter or paint them at home. In some cases the car owner may feel disposed to do some of the work himself and then pass it on for the professional painter to put on the finishing coats. He may, for example, give the car as thorough and complete a washing up as the painter will do. Then by getting the car up on stout wooden horses, so that he can work under it conveniently, the grease and dirt may be removed from the chassis. This is a somewhat smeary job, but anyone who isn't afraid of work can make some money by doing it. Saturate the greasy parts with one-third turpentine and two-thirds kerosene or crude oil, and let the applied mixture stand for several hours to soften up the hardened oil and dirt.

Then take a one-half inch putty knife and a couple of mowing machine knives and some pieces of coarse burlap, and proceed to cut and scrape the accumulations off and wipe the parts up. It may take two or three applications of the oil and turpentine mixture, and a lot of rubbing with the burlap to get the surface clean, but it is all necessary work.

If the surface is worn and the paint beaten off, and the bare metal or wood disclosed, these pieces will need touching over with a paint mixture containing at least one part raw linseed oil and two parts turpentine. Beat some oil, ground white lead and lamp-black up in this oil and turpentine and with a small round brush touch up the spots.

Next get some dry white lead and a small quantity of finely ground whiting, and using one part of the whiting to two parts dry white lead knead it to a good working body in equal parts of coach japan and rubbing varnish. Then with your putty knife putty up all the holes and surface fractures, filling them smooth and level with the surrounding surface. While this class of work is somewhat difficult to do well, with care and some practice it may be taken care of.

If the surface is in a condition suitable to sand-paper and apply the color without any further surfacing. The

professional painter may then, if so desired, be called in to sand this putty and the surface down smooth and apply a coat of color to the car. If any striping is to be applied, the lines may be run on this coat of color, after which apply one or two coats of varnish, according to the class of finish desired.

In case the car needs simply a coat of varnish, with perhaps a few worn or bruised spots touched up with a bit of color, it should first receive a thorough washing and cleaning. The body surface will need going over with water and pulverized pumice-stone to lay down the gloss and fit it for the varnish. Then touch up with the color where necessary, and apply a coat of body finishing varnish. Likewise, give the chassis a stout coat of varnish.

In this connection, it may be stated that the amount and kind of work to be applied to the car depends altogether upon the condition of the surface at the time the work is to be done, as it naturally also depends upon the sum of money the owner wishes to expend upon the work.

Generally speaking, if the car is kept well varnished, it will not need heavy painting repairs only at long intervals.

Luminous Bodies for Night Driving.

There is a bare possibility that automobile bodies may soon be made luminous at night, so that lighting will not be needed. It is stated that by mixing pulverized phosphorescent material, such as sulphide of calcium, and phosphorated zinc, together with a trace of bismuth, and adding some binder material, a water color paint may be secured, which if applied on the car body will make it luminous in the dark. It may be varnished over if desired and it is not affected by rain or weather. A luminosity of this kind would surely be quite as effective and less offensive to the eyes than lamps.

Care Needed in Home Painting.

From A. F. Dahlgren, Nebraska.—Several articles recently appearing in your columns on the subject of home painting of cars are valuable in many ways, but do not go into details as thoroughly as should be done when giving advice to those who have never attempted such a job before. Many amateurs have spent much time and money only to meet with disastrous results simply for the lack of a few reminders and cautions.

An Urgent Request.

Although we printed over 30,000 copies of the January issue, enough as we supposed to cover all requirements, the demand has already practically cleaned us out of that issue. Not that this particular number was any better than its predecessors, but many new subscribers wanted to start with January.

Any reader not caring to preserve his January number, who will send it back to us, will have his subscription extended for a month. He should notify us at the time the copy is returned, either by letter or postal card, so that proper credit may be given him.

Automobile Associations.

The Iowa State Automobile Association is attempting to form a club in every county of the State, the country clubs thus forming the State Association, and the different State Associations is to form the American Automobile Association. The objects of these associations is to secure good roads, just automobile laws, and such other matters as concern car owners and drivers.

HOW TO MAKE FRIENDS.

And a Good Way to Overcome Prejudice Against the Automobile.

From Fred Grundy, Illinois. — About the time I first began to caper about the country in my runabout ninety per cent. of the public was loaded with a deep rooted prejudice against automobiles. Farmers and teamsters lost no opportunity to turn loose a lot of warm language if their animals cavorted a little. This prejudice was incessantly fostered by a contemptible little eastern farm journal, and to a greater or less extent by some other agricultural papers.

Cussing back only made the rural belligerents uglier, so I used to chew wax to keep my vocabulary under control. I hated to go out for a little airing and come back loaded with gall and pugnacity, so I set my wits to work out the problem.

One day I was skipping along the road, feeling pleasant, and away ahead I saw four youngsters on their way to school, and as I passed the house they came out of, the woman ran out and gave a whoop to the kids to get out of the way. They ran into the ditch beside the road and waited for me to pass. Instead of passing I stopped and said:

"Pile in kids, and ride to school."

They came with a rush and away we went. They were a little scared, but at the same time highly pleased. And when I stopped at the school, about half a mile down the road they were profuse in their thanks, and all the other children and the schoolm'am appeared to regard them as heroes. I glanced back and saw the woman starting back into her yard.

I made a bunch of little friends right there, and whenever afterward I passed that way they always greeted me boisterously. Since that time I never have failed to pick up man, woman or child that I would come up with on the road, and a man living on that road once told me he heard one boy say, as I passed:

"That's that bully old feller who gives everybody a ride."

As I was coming in from the country one day I came up with a mean old fellow that had frequently fired off his mouth at me, and had said that every "automobiler" ought to be in jail or hades. He never stepped out of the track. I ran alongside and cheerily exclaimed:

"Good morning, Mr. Blank. Jump in and ride, it's easier than walking."

He hesitated a second, then got in. As we skipped along we talked about the weather and crops, and he became quite chatty, especially after we passed a few of his neighbors, who waved their hats and yelled at him. Ever since that he has turned to the side of the road and motioned me to come on. And there you have it. Give 'em a ride and you capture them.

I've had bushels of fun picking up school children and youngsters walking to town and carrying them where they wanted to go. I picked up three little girls one day, going to a friend's about a mile distant. A little redheaded whiffet sat beside me, and as we flew along she fairly screamed with delight, kicking up her heels.

"Ain't this swell?" she screeched, as we passed a neighbor's house with all the inhabitants on the front porch gazing at us. At the house we were going to a whole troop of children came whooping out to greet my passengers, and they fairly carried them up to the house.

Going along the road one day I picked up a country schoolm'am and took her to her school. As I returned in the evening she was just starting home and I asked

her to get in. She said the children had seemed to regard her as a sort of superior being all day, and had asked her innumerable questions about the auto she rode in.

Automobiles are more abundant now, and the prejudice against them is disappearing fast. Even the sniping little farm paper in the east has modified its tone. Farmers are getting autos as fast as they can afford them, and it won't be long before an auto driver will be considered an ordinary man instead of a pirate or a thug.

In the meantime, however, I shall continue to give everybody I can a ride, and thereby make friends for the automobile.

MAGNETO AND ENGINE DESIGN.

Location, Accessibility and Its Relation to Other Features of Automobile Mechanism.

F. E. Moskovics to the Society of Automobile Engineers:

The magneto manufacturer has had considerable annoyance to combat in the past, due to the fact that many engineers have not given sufficient thought to the correct disposition of the magnetos in their original designs. Some of this is adjusting itself automatically with the advent of the long-stroke motor, because inlet and exhaust manifolds are considerably higher than previously. But there still remains considerable room for work in this direction. These points, if considered in the first stages of motor design, will necessitate practically no additional work or cost and will certainly be of advantage to the user and in many cases to both the car and magneto manufacturer.

In considering the magneto in its relation to engine design, it might be well to make five classifications, as follows: First, there is the consideration of the proper location of the magneto, so that it will be free from excessive dirt, grit, water, oil, heat and other engine discharges; second, to so locate that the main parts of the magneto are accessible and visible, also not to obstruct or interfere with the accessibility of adjacent engine parts; third, accurate means of alignment with the driving mechanism—to eliminate undue wear on the universal joints, which in turn results in other disastrous strains, such as end thrust in the armature shaft, etc.; fourth, to so locate spark advance levers that they will operate freely and smoothly, giving full advance and retard without undue strains being set up; fifth, proper wiring of both primary and secondary and location of coils.

Location of Magneto.

Under the first head precaution should be taken that the magneto be so located that water or oil connections that might in time become leaky should not be close enough to cause trouble. Protection from the usual oil discharges from valve tappets and gear drive should be given. The enclosing of valve mechanism is curing much of this evil.

Care should be taken that the exhaust manifold is sufficiently clear of the distributor parts to absolutely insure their not being affected by that heat. Some magneto manufacturers are using a form of fireproof distributor for that very reason, such as bakelite.

In motor layouts where the carburetor is on the same side as the magneto it is often situated dangerously near the magneto circuit breaker and the distributor. This practice is to be deplored for many reasons. The carburetor flooding directly on the magneto or allowing

waste gasoline to collect near the sparking apparatus is frequently the cause of dangerous fires. This is especially the case with web-supported crank case arms. It must always be borne in mind that most magnetos are supplied with an exposed safety gap which if surrounded by a combustible mixture will immediately cause fire.

Accessibility.

Under the second head the writer would strongly urge that great care be taken by the engineer that the parts necessary to properly time the motor be easily accessible without the necessity of any unusual acrobatics on the part of the operator. This refers especially to the universal joint and the breaker box. Forms of joints which allow variable and positive means of setting are strongly recommended, and if accompanied with explicit instructions for timing will avoid the usual demounting of the gear covers to shift those usually inaccessible parts. It is also urged that in those motors where the magneto and carburetor are on the same side, sufficient room be allowed to make easy the examination of the platinum points in the breaker box without the use of mirrors and other makeshift methods.

On some cars the magnetos are placed so low that it is impossible to get at these essential parts without the removal of the sodpan. In many instances, to properly inspect the magneto it is necessary to entirely remove it; and in such cases the car owner has been compelled to pay for many makeshift and improper adjustments or for the time expended in removing and again setting the magneto. If properly placed the adjustment would have been made quickly and easily by himself. It is therefore strongly recommended that the magneto drive be on the same plane horizontally as the crank shaft and if possible even higher, which will, of course, bring the breaker box into full view.

Alignment of Driving Mechanism.

Under the third head we come to probably one of the most prolific sources of trouble, due to either improperly designed joints or improper machining of the magneto base, or both. To this is due largely the noise in the magneto and magneto gears, also the eventual breaking down of the bearings supporting the armature shaft, especially in ball bearing magnetos. The ordinary type of Oldham coupling in which the female member has become worn tends to create end thrust in the magneto bearings which they were never designed to absorb. So great care should be taken in machining the magneto base plate to the exact height and then furnishing rigid means of securing the magneto and seeing that the joint used is one that under a little wear will not tend to create undue end thrust. The writer would strongly urge that all universal joint parts be carefully hardened and that the material used be one which will take a good coat of case hardening.

Locating Spark Advance Levers.

The fourth consideration is purely a case of mechanics. Many designers leave the matter in the hands of inexperienced men, with the result that the breaker box is often subjected to strains for which it was not intended. Levers are often inadequate for the work in hand; proper regard is not paid to the levers, and often only a small part of the quadrant is used, and owing to an entire disregard of the law of the lever it is a matter of some inconvenience to advance and retard the breaker box.

Particular attention should be paid to the method of rotating the cam house, for if the force is not applied in approximately the same plane as the cam house bearings, there is a decided tendency toward undue sticking

and consequent wear. In order to avoid cramping and stiff working of the control mechanism properly designed cranks and clevises, and ball knuckle joints are advised. If possible the control mechanism should be so arranged as to be easily taken down. Split pins are very easy to put in but often difficult to get out.

General Design of Base.

Under this head it might be well to call attention to the general base design. Manufacturers employing cast iron crank cases are strongly urged to make the magneto base up separately from the engine base and use a non-magnetic metal in its construction. Experiments have shown that with certain magnetos the use of a magnetic metal in the engine base has caused a loss of as much as seven per cent. in the magnetic flux, which in turn affects the total efficiency of the magneto and more glaringly in slow speed operation. The base should be designed to be rigidly supported and properly webbed to avoid vibration.

Wiring Location.

Too little attention has been paid to the extremely important matter of wiring. On the modern car the high-tension circuits are usually well placed, due to the fact that trouble in them is so self-evident and develops so early. The art has progressed to such a point that probably any suggestions on the disposition of the secondary wiring would be superfluous. But it is to be urged that it is equally important to carefully segregate and insulate the primary wiring if for no other reason than the fact that it takes a long time for them to give trouble, but when they do it is one of the most annoying things to locate in the motor car. They should be located in such position that they will be free from oil and gasoline drippings and the heat of the exhaust manifold and that vibration of different parts will not tend to chafe or wear them. It is also suggested that where the primary wires leave a rigid part, such as the dash, a sufficient length should be left slightly coiled to fully compensate for any motion between these parts.

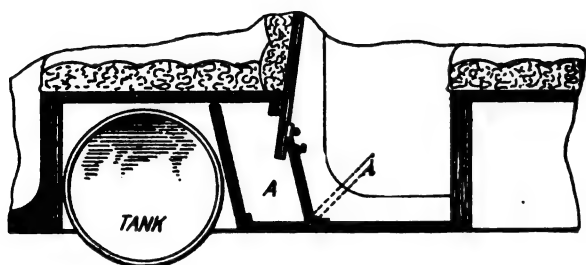
With the advent of the acetylene and other starting devices of the internal combustion type the matter of the location of the secondary coil again becomes a subject of some import. Practically all ignition manufacturers supply weatherproof coils, but all are not heat or oil proof. Therefore, it is suggested that it would be good practice to so locate the coil that the heat of the motor will not affect it any more than is absolutely necessary and also that it be free from the oils, water, gasoline and other engine discharges. This will add considerably to the life of the ignition system.

In closing it is safe to say that the magneto has arrived at a very high state of perfection, due mainly to careful specialization. Considering the work in hand, the instrument gives but little trouble and with the few points indicated, carefully watched the lot of the car owner will be made perhaps a little easier and the instrument itself will repay in longer life the slight expenditure of time necessary to accomplish these things. The manufacturer also will be well repaid now that car upkeep has become a considerable factor in his sales arguments. Many motors seem to be very carefully designed in all details except the magneto, which when installed appears entirely as an afterthought. Now that the magneto has become a permanent part of the motor it is felt that with these few suggestions the magneto manufacturer and the automobile manufacturer probably can work to a little better purpose and in combining their efforts work towards making the lot of the owner and repairman somewhat less complex.

Tool Box in Tonneau.

From E. J. McCall, New Jersey.—There is space in the Ford under the front seats, at the back, for a box as shown at A. This will hold a pump, jack, spare tubes, repair outfit and everything needed in case of tire trouble. The door swings backward with hinges on the floor. The lock and small handle are at the top. This should not interfere with passengers in the tonneau. In fact it will act as a foot rest.

The appearance of these cars can be improved by placing a wood strip (mahogany, varnished) along the tops of the doors and fastening strips down with brass



Place for a Tool Box.

screws countersunk in brass washers. On the foredoors this strip should be carried right up to the dash. To prevent the overflow from the radiator wetting things around the front axle, put a short length of "gas lamp" rubber hose on the end of the overflow pipe and let it hang down clear of the engine pan.

LESSONS FOR DRIVERS.

Carelessness and Ignorance Responsible for Most Accidents.

Some singular suggestions are made as a remedy for automobile accidents. A reader of the New York *Sun* favors the use of bells, such as are used on sleighs, and he thoughtfully remarks that he hopes that the objection will not be made that the noise of the bells would be "an annoyance." He says, "the sound of sleigh bells is pleasant, and every one loves to hear them."

The idea is plainly ridiculous, but it shows how prone many are to rush into suggestions without much consideration. In order to give sufficient warning of the approach of a rapidly moving automobile, such bells should weigh at least a hundred pounds each. In the quiet country, especially in winter, with horses dancing along at a speed of from six to ten miles an hour, little jingling sleigh bells are a sufficient warning of the approach of the sleigh, and at such speed one can easily avoid getting run over. But in the case of a swiftly moving automobile, especially in a noisy city, where the danger is greatest, such bells would be totally inadequate.

There is but one way to make the streets of cities safe for traffic, and that is to fix a speed limit that will not endanger the life or property of another, and if under such restrictions an accident does occur, it should be presumptive evidence of driving at a rate of speed which is not careful and prudent.

Appended are accounts of but few accidents only. They are samples of many, and it is hoped that they may serve as a warning against careless driving.

Steering Gear Breaks.—In Dallas, Texas, a car turned turtle, killing the driver. An examination showed that his neck had been broken. There were no bruises on the body except a few abrasions on the face. The accident occurred just after a short turn had been made.

The car skidded some thirty or forty feet, describing a half circle, and turned over at a point where the street was straight and almost level. Witnesses to the accident said the car appeared to leap into the air, fall on its side and roll over.

Killed at a Curb.—In Oakland, Cal., a man met death when his car struck a high curb. Three other companions in the car were thrown from the machine when the crash occurred, but all of them escaped injury. The four men took turns at the wheel during the trip. One had just taken charge of the car and was driving it at rapid speed when the bad turn was reached. He failed to keep to the road on account of the heavy fog and the machine dashed into the high curb. The impact drove his body against the wheel with such force that the entire steering mechanism was torn from the car.

Steering Gear Broke.—An automobile occupied by six persons bound for St. Charles, Ill., capsized while crossing the Illinois Central Railroad tracks. The occupants were seriously injured. The car was going west and was about to cross the railroad tracks when the steering gear broke and the car crashed into the embankment. The impact was so great that the car was thrown clear of the tracks to the opposite side of the right of way and landed bottom upward.

Struck with Terrific Force.—Four horses and a block and fall were required to separate an automobile from a telegraph pole, into which it crashed in Baltimore, Md. The man who was driving saw an approaching vehicle and turned his car. As he did so the rear wheels skidded, he lost control of the steering gear, and in an instant the front of the machine crashed into the pole. When they attempted to pull it away from the pole they found they were unable to move it. A close examination showed that the crank-notch on the front of the car was imbedded in the pole. Several other men were called and they all pulled the car but were unable to get the notch out of the pole. Then a horse was used. This was increased to four and re-enforced by a block and fall. At last the machine was pulled away.

Car Strikes a Tree.—A young woman was killed near Fresno, Cal., and a young man received a concussion of the brain when the car struck a tree. Two other women were painfully injured. The man was driving his machine at a high rate of speed; he seemed in danger of colliding with another car, and swerved suddenly into the curb, striking a tree.

Five Drown in a Canal.—Out of a joy ride party of six—three young men of good family and three girls casually met—who started in a high-powered six-cylinder motor car from Trenton, N. J., recently, only one is alive to describe one of the most serious accidents that reckless admixture of wine and gasoline has ever caused.

Three bodies were taken from the frozen water power canal on the outskirts of the Jersey capital, and the bodies of the others that perished are being sought. The survivor, who had been driving the car and was the only one not hopelessly entangled in the wreckage when it skidded from the slippery roadway into the canal, may die as a result of his icy bath and subsequent exposure. In haste to reach the other end of the journey and the warmth of indoors, Foster sent the car along at a fast rate. Passing vehicles had packed the snow on the road into solid ice and the machine swerved dizzily from one side of the way to the other, as evidenced by wheel tracks traced later in the day. There is a hazardous "S" turn in the road and the car skidded and went into the canal.

Side Curtains.

From J. A. F., Kentucky.—I notice in February number, an item from "Reader, Connecticut," inquiring as to the best method of carrying side curtains, when top is up, in sunny weather.

I have, for the past four years carried my side curtains at all times, when not in use, in the bottom of the tonneau, in front of the foot rail, close up against the back of the front seats and find it very satisfactory and so far, my side curtains are in perfect condition.

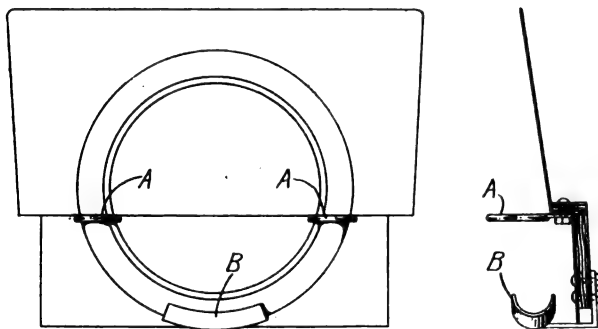
To enable me to do this, I take a piece of heavy paste-board, and the wide curtains are folded flat, with the isinglass flat, and the balance of the cover turned back over same. The small curtains are folded the same way. I fold them over with the paste board on the inside. This prevents the breaking of the isinglass, although I lay the curtains in such a way, that as little of the isinglass as possible, is folded. I do not press this package down flat but fold it over and allow it to lay in natural position. I then, wrap the entire package up in oil-cloth, which is sufficiently large to double or fold in at the ends, thus preventing dust or dirt from getting inside of the package. A leather strap at each end to hold the package in shape, is all that is necessary.

This package is then laid with the round end next to the back seat, with the sharp edge out, and so far I have succeeded in taking care of my side curtains without a single breakage.

I have a five seated "Olds," which is quite roomy in back seat, but as I carry additional passengers, they are subject to the ordinary amount of abuse. My side curtains, after four years' use, are practically as good as new.

Rear Tire Holder.

From E. J. McCall, New Jersey.—A rear tire holder can be arranged by using two ordinary tire holders and



Sketch of the Tire Holder.

bolting them on to the back of the car as shown at A, far enough apart to catch the sides of the tire. The bottom is held in a cup shaped bracket as shown at B. Care should be taken to see that the bolts go through the wood portion of the car back. Use leather straps to secure the tire.

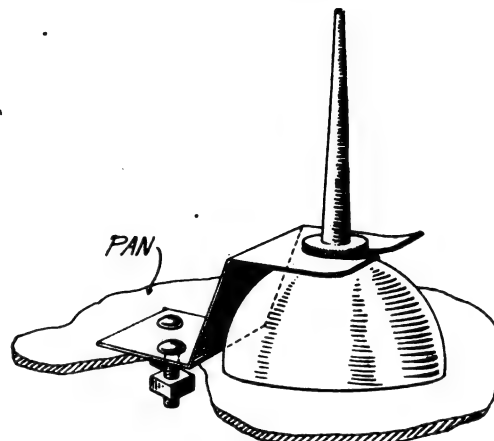
Classified Advertisements.

If you have a car for sale or to exchange or anything else in connection with your automobile that you want to sell, or if there is anything second-hand you want to buy, a little advertisement in our Classified Department is likely to produce excellent results. These little advertisements only cost three cents a word including the address for each insertion, and no advertisement is inserted for less than fifty cents, no matter how small. Remittances can be made in postage stamps for frac-

tional parts of a dollar. Address all orders to Motor Vehicle Publishing Company, Publishers of The Automobile Dealer and Repairer, 71-73 Murray street, New York City.

Oil Can Holder.

From E. J. McCall, New Jersey.—Carry the oil can under the hood of the engine. To keep it from moving about make a piece of heavy brass or iron like the sketch.

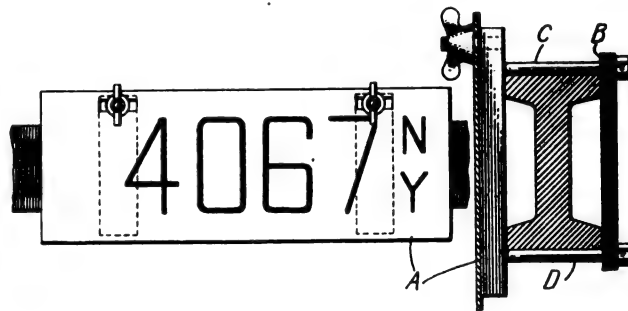


For the Oil Can.

Fasten to the pan beside the engine on the steering side by means of two small bolts and nuts. Shape it so that the spring in the metal will hold the can securely.

Front Number Holder.

From E. J. McCall, New Jersey.—The front piece A has two bolts rivetted on C and D. This is slipped over the axle and the back piece B is fastened on with nuts. A has also a small bolt with a butterfly nut to which



To Hold the Number Plate.

the plate is secured. Space the brackets so that they come near the slots in the plate, as shown at the right.

Fierce Clutches.

Sometimes the leather transmission clutch will be found to be fierce, however gently it is engaged. This, of course, is injurious both to the tires and to the back axle. Cases have been known where a car on which, before storing, the clutch acted beautifully, but which after standing for a few weeks in storage, behaved in a fierce manner. The best plan to adopt when the leather becomes dry, causing this sudden action, is to disengage the clutch surfaces and keep them in a disengaged position by using a strip of wood. Then the leather can be given a liberal application of castor or cotton seed oil. If this is done occasionally, it will be found that the leather will be kept from getting hard, and will prevent the clutch from engaging fiercely. At the same time it is advisable to examine the clutch spring, as this can



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FREE TRIAL Send us bank references, and we will ship you promptly complete outfit. Try it on your own tires yourself for ten days. If it is not entirely satisfactory and the best investment you ever made, send it back. That's fair! But we know we will get the \$12.00, as you would not part with the "National" for three times its cost after you know what it will do for you.

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often be adjusted so as to slacken the tension on the clutch and this will often be found to be a remedy and allow the clutch to be let in without any serious damage to the axle or tires.

Heat Your Gasoline.

From J. A. F., Kentucky.—I have noticed several items in your magazine, suggesting the heating of the manifold in cold weather, in order to reduce cranking. I did this for some time with excellent results. I then commenced to study the problem, why this should be done, and decided on a much more simple method. That is, I heat the gasoline with which I prime my engine. This gives me, if anything, much better results with a great deal less trouble and less danger of getting water in the carburetor.

Going into detail, would say that I carry at all times, an oil can full of gasoline on my engine. This is available for any use I may wish to use it. In order to prevent evaporating or spilling, I unscrew the spout and place a small bottle cork on bottom end of the spout, thus completely stopping evaporation. (Do not forget to remove this cork when you go to use your can.)

Next, I have adopted the following method of priming. I have tapped my manifold at the point where it branches off to the different cylinders, inserted a $\frac{3}{4}$ -inch brass nipple, to this an elbow, then a nipple and to this I have attached a Lunkenheimer grease cup, with brass top and needle stem valve. This grease cup is glass, all except the top and bottom.

In priming the engine, I close the needle valve, fill the grease cup one-half full of warm gasoline. I then back out the needle valve and turn the engine over and usually the one turn gives the desired results. As the needle valve does not allow the gasoline to run rapidly into the manifold, it gives me sufficient warm gasoline to get my engine going, so that the gasoline from the carburetor is taken up and used before the warm gasoline is exhausted. In order to retard the flow of the gasoline, I have crimped some very fine sheet brass, making a roll about one inch long and pushed it into the end of the brass nipple, where it is attached to the manifold. This retards the flow of the gasoline until you commence cranking. It also has a tendency to break up the gasoline, as it reaches the manifold more in a spray than a solid stream. This is all very simple and any one can attach the whole outfit in a few minutes themselves and the only thing necessary to purchase is the Lunkenheimer grease cup, and the brass nipples. This will obviate the necessity of pouring raw gasoline into your priming cups on the cylinder, which has a tendency to cut the oil film from the top of the plungers.

In ordinary weather, when it is necessary to prime my engine, I do not heat the gasoline, simply prime through the grease cup, above mentioned. In extremely cold weather, I take with me to the garage, a vessel containing some hot water; set the small can containing the gasoline in the hot water, while I am getting the machine ready and when ready to start, fill the priming cup half full of warm gasoline, turning over the engine and usually the first turn is sufficient.

I am sure, when this arrangement is used once, that it will be continued, wherever priming is necessary.

Who Can Tell About the Yale Car?

One of our subscribers has a Yale car and wishes to get a new motor for it and possibly one or two other parts. Can any reader tell him if these parts are now carried by any one or where he can get what he wishes?

STEAM CAR DEPARTMENT

This department is intended for owners, users and others interested in the steam car.

Those who have trouble with their steam cars are asked to give clear and full particulars, and their queries will be answered as correctly as possible by an expert. It will be considered a favor if our readers will contribute to this department, giving such information as may be useful to others using the steam car.

Troubles of Steamers and the Remedies.

From T. S. Hopkins, Washington.—I own two Stanley steam cars—one, an old model runabout, I keep on my summer place in Mount Vernon, Me.; the other is a roadster, 1911 model. The former is ten and the latter twenty horsepower.

I have had very little tire trouble with either of my cars; nor have I had very much trouble of any kind. I will try and state, for the benefit of your readers, some of the troubles I have encountered, and how I have surmounted them.

Once the water supply in my tank gave out, of which condition I was warned by the sudden lowering of the water in the boiler. I refilled the tank, and being on the crest of a hill, and having a little steam left, I closed the by pass and coasted down the hill, feeling sure that when I reached the bottom I would have considerable water in the boiler. At the foot I turned on the main burner, and in about two minutes I blew out a plug. The explanation of this was that owing to the draining of the water tank, air had gotten into the pumps; they were air-bound, and when I closed the by pass and began to run, no air was pumped into the boiler. Had I opened the by pass, and run a few hundred feet, the air would have been expelled, and then, upon closing the by pass, the pumps would have performed their duty.

I found, on a good many occasions, that soon after starting my car, the steam would run down, and upon examination discovered that the pilot was out. This puzzled me for a long time, until I learned that, generally, it was the result of the exhaust when I started the machine. It put the pilot out. Now, just before I start, I open up the main burner, and I have had no trouble since with the pilot going out. I have also noticed that when the rear wheels are standing on ice, or on any slippery place where, when I turn on steam, the wheels will slip and revolve very rapidly, it almost always puts out the pilot. Whenever the wheels do this, I advise that an examination be made to see if the pilot is out.

I think it wise, whenever one gets up steam in the morning, to turn the screw that holds the wire in the pilot nozzle, back and forth several times, remove it and clean it thoroughly before replacing. While it is out, there being no fire in the burner, I open the pilot valve for an instant, once or twice, forcing a little stream of gasoline out, thereby cleaning the tube if any particles of dirt have lodged there. Beyond these precautions, if one has a good pilot, he will have little trouble with that part of his machine.

In getting up steam, it is best to let the pilot burn a few minutes if the water in the boiler is cold, so as to heat up the vaporizing tubes. In first turning on the main burner, it will often force raw gasoline under the burner with a spitting noise. The gasoline can be readily seen, as it is forced in, whereas when it vaporizes, the vapor cannot be seen. I open the main burner at first very slightly, then close it and repeat the operation until the tubes are sufficiently heated to vaporize the gasoline. I do not open the main burner fully until some steam

* the oil that lubricates most *



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A GRADE FOR EACH TYPE OF MOTOR

If oil saves power, it follows that
one oil saves more power
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begins to come from the drip valve. Then it is safe to open it wide.

There are three things that one should do, and never fail to do before lighting the main burner. Otherwise, he will have trouble. He should, first, see that there is water in the boiler; second, open the throttle; third, open the drip valve.

I would not tolerate a leaky throttle. It injures the packing in the cylinders, floods them with water, and wastes the gasoline. I would advise opening the drip valve whenever standing still, and I would start the machine and run it for several revolutions of the engine, starting very slowly. This frees the cylinders from water. If the car does not move when you have opened the throttle, close the throttle, reverse the engine, and let it move back a few feet. Then release the reverse, open the throttle, and it will start ahead.

I hope that others who have steam cars will tell us of their troubles and their remedies. I have been looking for a long time for a magazine that had a steam car department, but have not found one before.

To Inexperienced Stanley Owners.

From A. N. Henshaw, New York.—The writer once met in a repair-shop a man who had driven his car sixty miles just to get a burner-valve ground, a job which he ought to have been able to do himself, and which can be done in five minutes. To grind any needle-valve, unscrew and take out the valve-stem, press the point into a piece of pine or other soft board, fill the dent thus made with fine emery powder, or better, with powdered glass, drop a little machine oil upon this, press the point of the valve into the hole, bear down on it a little, and turn the point back and forth a few times in the paste made

by the oil and powdered glass or emery. Then wipe the point clean and screw the stem back into place. This will generally make the valve tight. If the steel point is smooth, it will probably seat itself in the softer brass of the valve-seat. Some prefer to grind the point in lead rather than wood. If a lathe is handy, the stem can be put in the lathe and the point trued down, but if this is done often, it shortens the stem. The writer once had trouble with the water-pumps of his Stanley, and found that the water was being returned to the tank even when the by-pass was closed, owing to the fact that the by-pass valve had been trued in the lathe so often that the threads were too short to allow it to seat, even when screwed down as far as it would go. This was easily remedied by threading the stem a little further up.

It is necessary to know how to pack a burner-valve. To do this, unscrew the stuffing-box, or hexagonal nut through which the valve-stem passes, push this and the gland along the stem so as to get at the packing, remove the old packing, cut off a piece of new packing about the length of the old—longer if there is room for it—wind it around the stem and press it into place, cover it with the gland and stuffing-box, and screw up the latter, not too tight, or the valve will turn hard, not too loose or it will leak. (The burner-valves on the older Stanley cars are without glands.) There is a valve between the burner-valves and the pressure-tank, which should be closed before unscrewing the stuffing-box.

If the beginner does not know how piping is put together, it will pay him to buy a union, nipple, etc., of the size used in his car, and study out how they are connected and disconnected. Knowledge of these simple matters makes one far more independent than he could be without it. Anyone who has charge of a sta-

tionary engine, or any plumber or machinist, can show how the wrenches should be used in putting piping together or disconnecting it.

A word or two of warning as to the operation of the car. Close the throttle entirely after reversing, before giving steam to go ahead. Or in other words, shut off steam before you release the reverse. If the throttle is left open when the reverse is released, the steam in the steam-chest may hold the slide-valve tight, so that when the throttle is opened wider the car will shoot backward instead of forward. It is easy to see that in certain situations a serious accident might result.

In some of the Stanley cars the hand-gasoline pump has no separate check valve. This is true of many of the little runabouts with folding front seat, which can now be bought for a mere trifle, considering the excellent service they are capable of rendering. In these cars, the operator, before starting, should be sure that the valve of the hand-gasoline pump is closed. If it is left open, the action of the power-gasoline pump may force out the plunger of the hand-gasoline pump and flood the floor of the car with gasoline.

In conclusion, the beginner is advised to study carefully the book of directions supplied by the Stanley Company, and heed everything therein contained, even if it is a hint expressed in the fewest possible words. The illustrated price-list of parts will also be useful in learning to understand the car.

Steam Car Lubrication.

Although there are several types of steam car engines, the system of lubrication is the same with all of them.

The cylinders are lubricated by a forced mechanical lubricator, which either forces the oil direct into the steam chest of the engine, or into the steam pipe between the throttle and the engine. In either case the results are the same—the steam meets and breaks up the oil and carries it over the whole internal surface of the cylinders, pistons, etc. A similar result can be obtained by feeding the lubricating oil into the induction pipe of a petrol motor, but there are many serious objections to this on a gasoline engine which do not apply to a steam engine. It is practically impossible to over-lubricate a steam car engine, and, in any case, smoking so as to become a public nuisance is impossible.

One type of steam car engine—the single acting—almost exactly resembles a gasoline engine, and has poppet valves. The cylinders in this engine are in direct communication with the crank chamber, from the splash of which some of their lubrication can be obtained.

Some of the old cars fitted with this type of engine relied entirely on the splash lubrication, but with not very successful results.

While there might be ample oil to lubricate the crankshaft, etc., there might also be insufficient to splash on to the pistons, the engines running very slowly compared with gasoline engines.

In the double acting engine, the cylinders have no connection with the crank chamber, and thus must rely entirely on the oil forced in with the steam. All steam car engines rely on splash lubrication for the crankshaft, connecting rods, etc., and on forced feed for the cylinders, but for the cylinders of single-acting engines a combination of both systems is employed. In some types of steam cars a mechanical lubricator is

fitted which supplies oil to the cylinders only, the crank chamber being filled up periodically like the gear box of a gasoline car.

Other cars have a mechanical lubricator which supplies oil to both cylinders and crank chamber. While the failure of the lubricator on a steam car engine is serious, it does not cause actual damage so soon as a similar failure would on a gasoline engine. Failure of the cylinder lubrication is generally denoted first by blowing through badly at starting, and, secondly, by squeaking and harsh running.

On most cars there is a tell-tale of some sort to show if the lubricator is working or not, but it is as well not wholly to trust to this, but to see that the oil is actually going out of the lubricator. On the White cars the lubricator is fitted on the dashboard, and has two gauge glasses, the consumption of the oil being thus plainly indicated to the driver by a mere glance at the lubricator.

The stoppage of the crank chamber lubricator, if one is fitted, is not serious, as there will be enough oil to run the car a long way without damage.

The stoppage of the cylinder lubricator must receive instant attention. On most cars there is a provision for working this by hand or foot while driving, and a charge should be given several times a mile as regularly as possible until the lubricator can be examined.

In every case the oils recommended by the makers of the cars should be used, and if these are not available, it should be borne in mind that the only oil that can be substituted for the correct brand on steam cars using superheated steam is good air-cooled cylinder oil. On single-acting steam engines the same oil must be used for crank chamber as for cylinder lubrication. On double-acting steam engines any good lubricating oil, free from acid, can be used in the crank chamber.

With engines having ball bearings an addition of 10 per cent. of pure lard oil to the oil put in the crank chamber will greatly prolong the life of the bearings. On no account must the lard oil be fed to the cylinders.

Gasoline and Steam Cars.

From T. S. Hopkins, Washington.—Both steam and gasoline cars have their strong and their weak points. For some purposes the gasoline car is superior to the steamer, and on the other hand the steamer has its advantages too. Personally I prefer the latter. One has more reserve power, and no reasonable hill has any terrors for him.

In the recent models of the Stanley Steamer there is an automatic cut-off that put out the fire, if, through an inadvertence or accident, the water in the boiler gets too low. There is, therefore, no more blowing out of plugs. Owing to the lightness of these steamers it is unquestionable that the tires last longer than in the case of gasoline cars. I have had practically no tire trouble.

Almost invariably when I invite someone to ride with me, and open the throttle, he or she exclaims, "How beautifully smooth and noiselessly it moves off!" There is an utter absence of the grind and roar of the gasoline car when started. Then, in a crowded throng, or elsewhere, if one wishes he can slow down and barely creep along.

I have learned by experience some things about a steamer and I will put them in writing some time and forward to you. I hope other steamer owners will do the same thing. We may in that way be a great help to each other.

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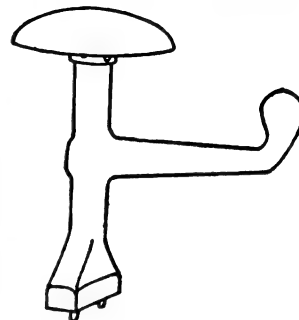
Price, \$1.00 each.



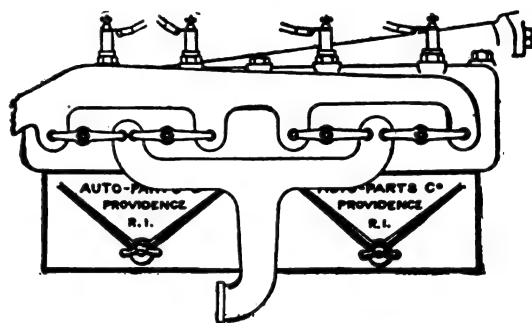
VALVE GRINDER

The most practical tool on the market and the only one that will grind the last valve on the Model T Ford. Nicked and polished.

Price, \$1.00 each.

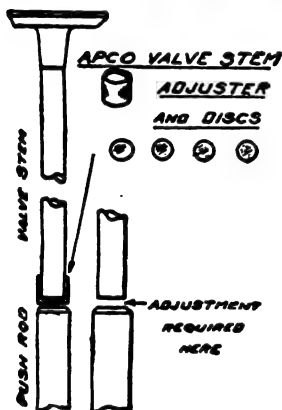


VALVE SPRING COVERS



Aluminum plates that completely enclose the valve springs, etc., on the '09-'10-'11 T Ford cars. Keep the oil in and the dirt out. Can be applied in ten minutes with no machine work.

Price, \$3.50 complete set.

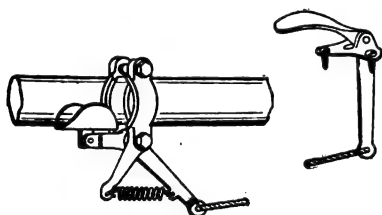


VALVE STEM ADJUSTERS

(PATENTED)

Hardened steel caps that slip on the end of the valve stems and with each set we furnish a supply of discs to take up wear. Most noise comes from badly adjusted valve stems. The APCO Adjusters can be put on your car in an hour and are guaranteed to be satisfactory. Will fit Maxwell, E. M. F. and all Ford Cars.

Price, \$1.50 for set of eight.



MUFFLER CUT-OUT

The simplest device ever offered. Furnished with everything necessary to apply. A Cut-out should be on every car and you cannot afford to be without one at this price. Made for 1½ in. pipe only.

Price \$1.50, with lock-open brass pedal.

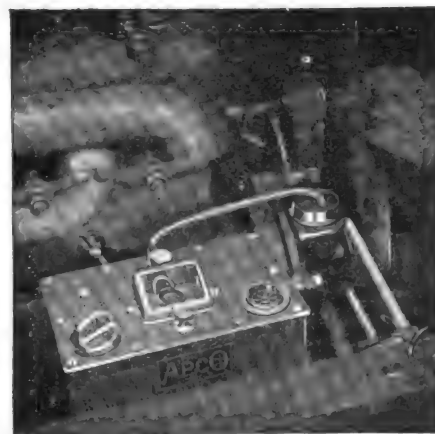


OILING SYSTEM

For Model "T" FORDS

An adjustable mechanical Oilier that will maintain a level in the crank-case of the T Ford. Reservoir holds two quarts, enough for 350 miles continuous running. Eliminates smoke, carbon, dirty valves, sooted plugs. Will save its cost in six months. Guaranteed satisfactory in every respect or money will be refunded. Furnished with everything necessary to attach to car. No machine work necessary to install.

Price, \$12.50 complete.



MOHAIR SLIP COVER.....	\$7.50
AUTOMATIC CLUTCH RELEASE.....	2.00
REAR AXLE TRUSS.....	3.00
ELECTRIC LIGHTING OUTFITS.....	8.00
BREATHING PIPE.....	1.50

EXHAUST WHISTLE.....	\$3.50
VALVE SPRING REMOVER.....	1.00
FOOT ACCELERATOR.....	3.50
ELEVATED TIMER ATTACHMENT..	8.00
ALUMINUM HEEL REST.....	1.00

AUTO PARTS CO., FORD DEPT., Providence, R. I.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

Who Will Tell Him?

From Charles Green, Michigan.—I am the owner of a Stanley steamer. I have been bothered with my fire. I have cleaned out all pipes, burners and nozzles, and my pressure seems to be all right. When I get about 200 pounds of steam she backfires and at times

there seems to be an explosion. Please be so kind as to ask some reader what the trouble may be.

Gas Pilots for Stanley Cars.

In answer to inquiries, it may be stated that gas pilots for Stanley cars can be purchased of the makers, H. C. Knudson & Company, Springfield, Mass.

The Rapid Auto Cleaner and Polish.

This is manufactured by T. R. Shannon, 19 Lorraine St., Hartford, Conn. This preparation has a well-earned reputation among automobile owners, who have thoroughly tested it, with satisfactory results. It removes grease, dust, mud and rain spots, without the aid of soap and water, preserving and restoring



and more durable, preventing a grimy, dirty appearance and keeping the leather clean and bright.

After applying, the Rapid Auto Cleaner and Polish will not become soft and sticky, nor will it hold dust, if the directions are followed out. It is a labor and money saver, for by its use, less time is required to clean the car. Soap and water, which are necessary to clean an automobile of mud, grease and dust, soon destroy the varnish. A dry cloth, or a feather duster, when used on a highly polished surface, is positively injurious, destroying the lustre, and leaving scratches and spots. The Rapid Auto Cleaner, when applied over mud, dust or grease, will not produce scratches, if used as directed. It cleans and polishes all kinds of varnished surfaces, such as the interior woodwork of your home, office, or store, also restaurant counters and tables, bar fixtures, billiard tables, pianos and furniture of all kinds. It removes soil, stains, spots, scratches, greasy finger marks, and in fact, all the marks of time and use. Its use restores all the original beauty and lustre, with the least expenditure of time and labor. When applied, the Rapid Auto Cleaner and Polish dries quickly, by rubbing the surface with a dry, soft cloth. It leaves the surface free from moisture, gum, grease, or soil of any sort which will stick to the hands or clothes. It can be applied to any surface without fear of damaging the same.

It is largely used in garages, factories and sample rooms, all over the country,

and the demand is constantly increasing.

If your dealer does not carry this polish in stock a liberal free sample will be sent to any reader who will mention this publication. See advertisement for prices in quantity. Write for circular and particulars of free sample of the polish to T. R. Shannon, 19 Lorraine St., Hartford, Conn.

"A Mountain of Evidence."—The B. F. Goodrich Company of Akron, Ohio, with branches and tire depots everywhere, have an attractive full-page announcement in this issue which will be likely to interest a good many of our readers. This company claims that one-fifth of Goodrich tire users never have a puncture or blowout in a season's run, and that they have never had a complaint of the tread separating from the body of the tire. They publish a very interesting book entitled "Nine Prophets and a Host of Truly Wise Ones" and would like to send a copy of this book to every reader of The Automobile Dealer and Repairer. Write at once before you forget about it and mention this paper.

If testimonials mean anything, and of course they do mean much, then the Duryea automobiles are mighty good ones. The Charles E. Duryea Co., Saginaw, Mich., have just issued a little booklet which is full of the highest praise that delighted users can utter. Better send and get it, if for no other reason, just to see what those who use their car have to say in its favor. The letters all bear names and postoffice addresses.

ing the varnish and enamel. It cleans, polishes and improves the leather upholstery, making the same soft, pliable

DON'T NEGLECT THIS OPPORTUNITY.

If you do not keep yourself well informed as to what is going on in the advertising pages of this magazine, you are neglecting your opportunity. There is something new in every issue that you as a car-owner or dealer or repairman ought to know.

It is of course impossible for an advertiser to more than give the rudiments of what he has to offer, but in every case if you will write him he will be glad to give you the fullest particulars and to do so promptly.

In these days of a constant recurrence of new things you cannot be well informed unless you write for such information.

The mistaken idea that advertised goods are not the best goods has long gone out of date. They are not only the best but the cheapest goods. No man can afford to sell at a small profit unless he does a large business and no man can do a large business unless he advertises.

Moreover, an advertised article is more likely to prove satisfactory than one not advertised. The manufacturer who does not make his goods conform to the standard set in his advertisements invariably finds that such advertisements will not prove permanently effective. He is thus compelled by policy as well as principle to do as he agrees to do.

It is to your interest, therefore, to familiarize yourself with what is going on in these advertising columns.

The Atwater Kent Ignition System

Prepare Now for Summer

BETWEEN now and Spring, thousands of Atwater Kent Systems will be installed on new and old cars of nearly every make and model. Every dealer, garage and repair man, as well as every car owner, should keep in touch with us during this overhauling season.

Many cars need only a reliable and efficient ignition system to make them run better than new—and now is the proper time to make the change.

The Atwater Kent System gives better results than the best magneto at less than half the cost. There is practically no wear, and its single simple adjustment seldom requires attention. It is easy to install.

In the entire system, there are but three moving parts and one contact—no commutator, relay, or vibrating coils are used. A set of ordinary dry cells will run your car 2000 to 3000 miles. No more simple or efficient ignition device is known.

Write now for new illustrated booklet "G" with interesting details and full description.

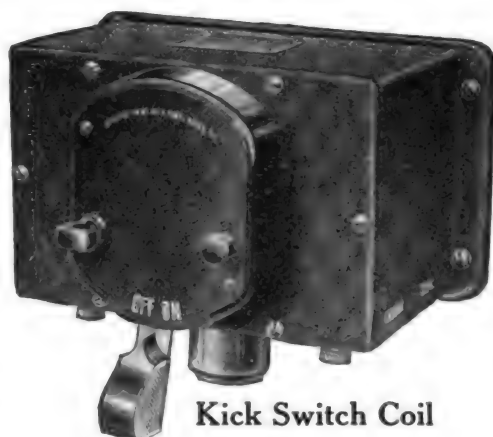
Atwater Kent Mfg. Works

42-50 N. SIXTH STREET

PHILADELPHIA, PA.

DISTRIBUTORS

New York.....E. J. Edmond Co.	Milwaukee.....Julius Andrae & Sons
Boston.....F. R. Parker Spec. Co.	Omaha.....Omaha Rubber Co.
Chicago.....Motor Car Supply Co.	Chattanooga.....Sanford Bros.
San Francisco.....Chandler & Lyon M. S. Co.,	Dallas.....Fiske Co. of Texas
Weinstock-Nichols Co.	



Kick Switch Coil

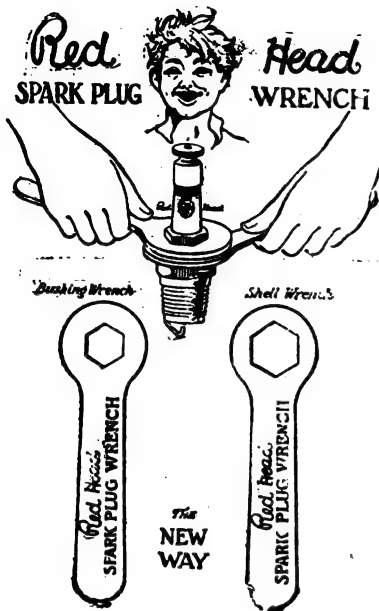


Special Outfit
for 2 cyl.
Buick Cars

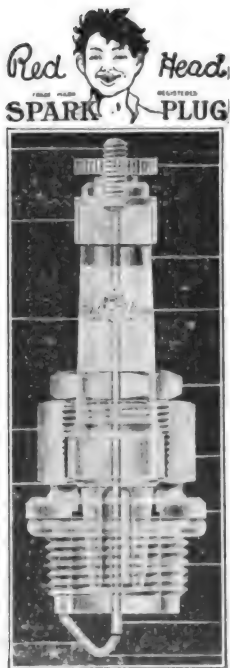
Also Special Outfits for Fords
Maxwells and Franklin Cars

A Big Spark Plug Gift.

With a blaze of publicity pyrotechnics, the third anniversary of the inauguration of Red Head spark plugs was commenced by the Emil Grossman Company March 4. Custom gives mortals but one day in which to celebrate their birthdays, but the sorrel-topped sparking



success will stretch the joyous occasion over a space of two months. This is to say, the owner's coupon issued in honor of the event which entitles motorists to a generous slice of the birthday cake in the shape of five Red Head Plugs, one porcelain or mica core and one set



of Red Head Spark Plug Wrenches, will be redeemable until May 1, 1912.

In special trade literature novel anniversary package assortments have been announced. These packages offered in four varieties contain a proper assortment of sizes of Red Head Plugs, a percentage of extra porcelains and a liberal supply of advertising matter and

circularizing material, are designed to relieve dealers and jobbers of perplexity in ordering, insure a continuous supply of fresh advertising matter and eliminate much detail and dispute over possible shortages.

The same thoughtfulness that considers the problems of the trade is responsible for the Red Head spark plug wrench. Although the need for a flat wrench for handling spark plugs always existed, the Emil Grossman Company is the first to recognize the fact. The Red Head wrench set consists of an 11-16-inch wrench for the bushing and a 7/8-inch wrench for the shell. By using them damage to plugs is eliminated, for the size of the wrench does not permit of a leverage sufficient to produce a pressure dangerous to the porcelain. Also, Red Head wrenches being flat, grip the hex firmly, and cannot slip off and break the porcelains. One set of Red Head wrenches is given with every set of four Red Head plugs at the regular price.

The mechanical success of the Red Head Magneto Plug ushered into the motoring world on July the 4th last doubled the previous year's sales. This is evidenced by the published roster of 234 jobbers who are handling Red Heads, by the contracts with 73 manufacturers of automobiles, motor trucks, motor boats, motorcycles and gas engines, among whom are to be found the Simplex Automobile Company, Hup Motor Company, Interstate Automobile Company, Metzger Motor Car Company, Grabowsky Power Wagon Co., Federal Motor Truck Company, Mais Motor Truck Co., Miami Cycle & Manufacturing Company, New Era Auto Cycle Company, Foos Gas Engine Co., Brennan Motor Co., etc. During the past season additions to the Red Head racing "staff" include such successful drivers as Eddie Hearne (Renz), Evans (E-M-F), Parker (Fiat), Sydney Smith (Fiat), Mitchell (Abbott-Detroit). The nucleus of this winning combination was made up of Ralph DePalma, David Bruce-Brown and Caleb Bragg.

"Metalite."—The Marshall Oil Company of Marshalltown, Iowa., have a preparation called "Metalite" for removing carbon from gasoline motors. The idea in a nut shell, as they say, is that it cleans your dirty motor just as shot cleans a bottle and then disappears. "Metalite" is guaranteed not to contain any acid, grit or any substance that could possibly scratch, mar or damage the polished surface of the motor. It is well known that carbon deposits damage a motor materially. The carbon gradually becomes thicker and harder, and as it thickens and hardens, the heat caused by the exploding gas makes it red hot. This red hot, flint-like carbon causes pre-ignition (exploding of gas before the proper time) of the charge of gas in the cylinder, which makes a motor work against itself and causes it to knock and pound, and this knocking and pounding sets up a vibration that causes a rapid crystallization of the steel parts, such as the crank shaft, connecting rods, etc. Carbon greatly shortens the life of a motor and soon destroys its easy operation. It is impossible of course to prevent carbon deposits, but with "Metalite" you can remove it without taking the motor to pieces. It is claimed with this preparation that within two minutes every particle of carbon can be removed. "Metalite" may be further de-

scribed as a soft combustible metallic compound in the form of small cubes and it does its work mechanically without any danger to the motor or causing any harm whatever. There is a good deal more that might be said about "Metalite" which the manufacturers say in a little booklet much better probably than we could say it. Write to the company as above for one of these booklet which cannot fail to be of value to every owner of a car.

Gilmer Tire Repair Pliers.—A patent instrument of interest to motorists who may desire to make the keeping of automobiles as economical as possible, has recently been put on the market. Realizing that the rapid deterioration of tires was in a vast majority of cases due to neglect of open cuts, a number of the best known tire makers and some twenty other concerns have placed on the market various rubber gum compounds. In the use of these it is necessary to clean all the dirt out of the wound, then wash it with gasoline, afterwards applying cement and kneading the gum into the opening. This soon hardens, and becomes an integral part of the tire, effectually healing the wound. The whole success of these very meritorious gums is dependent upon the thorough cleansing of the cut and exposed portion of fabric so that the cement will properly adhere and bind the gum.

Gilmer's Tire Repair Pliers is an instrument for doing this work. The long thin lips of the pliers are at right angles to the levers so that they can be inserted into the wound, without tearing it. The levers are then used to pry the cut open, after which by the use of a small flat spatula (furnished with the pliers) it is possible to clean out all the dirt, and furthermore, to make sure with your eyes that it is all out and then to apply the cement thoroughly and evenly to every corner of the exposed fabric and rubber. This done and the gum worked well into every portion of the wound; your tire is as good as new. An important point in the manufacturers' claims for attention is that only with these pliers is it possible to open the rubber to expose the fabric. Particular stress is placed on the necessity of cementing this gum to the fabric at the bottom of the cut rather than just cementing to the rubber round the edge of the hole, as is done when the repair is attempted without some means of properly opening the cut.

These pliers are nickel-plated steel with tempered jaws. The central lever shown in the cut operates one jaw, while either of the out levers will operate the other jaw, according to whether the pliers are wanted for gripping as in ordinary use, or for opening cuts in tires. A small spatula or cleaner is supplied with each pair of pliers. This has each end curved, one with the round point for cleaning and the other a flat end for forcing the gum into the cut.

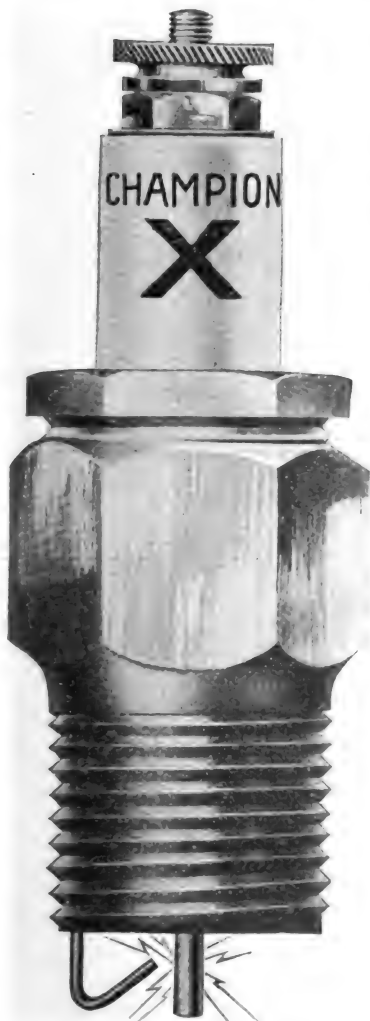
These are very adaptable and convenient pliers for other work than the repair of tires, as they are serviceable as ordinary pliers and for cotter pin work. The pliers are manufactured by G. Walker Gilmer, Jr., of Philadelphia, Pa., who will be glad to furnish full particulars if you mention this magazine.

Subscribe to the "Automobile Dealer and Repairer," \$1.00 Per Year.



TRADE-MARK

CHAMPION SPARK PLUGS



CHAMPION X
75 Cents

The reputation of Champion plugs for all around efficiency, is known the world over. Dealers and the public in general look upon Champion plugs with the same confidence as displayed in any other standard article.

The Champion Company does not have to trade upon exaggerated statements or promises of what their plugs **will** do. A surer and safer way of exploiting their product is to show by plain facts what they **have accomplished** and are doing **right** now.

Champion plugs are specified in over sixty per cent of the automobiles manufactured in America for 1912. Ford, Overland, and over fifty other representative makers use the Champion plug exclusively in their regular equipment.

Leading dealers and jobbers carry the Champion plugs. Should you find one that does not, do not be influenced into buying one "just as good" but write direct to us.

Also insist upon the **genuine** Champion. The World trade mark (shown above) appears on each box and the name Champion is plainly marked on the porcelain.

We have an excellent equipment proposition for manufacturers.

Write for the details at once.



Where Champion Spark Plugs are made in Toledo.

CHAMPION SPARK PLUG COMPANY

Dept. F, TOLEDO, OHIO

Standard Tire Protectors.—The Standard Tire Protector Company, 350 E. Market Street, Akron, Ohio, announce in a full-page advertisement in this issue that they will send to every reader interested a book on tire protection absolutely free. Their tire protectors are made of rubber and fabric and are easily and quickly applied. They say sand or gravel cannot get between the protector and the tire, and that you get skidding protection as well as tire protection. This company has a special proposition to make to dealers referred to in their announcement. Write to them at once, if you are interested, mentioning this magazine.

"Evernew" Auto Top Dressing.

This fills the want so long felt among automobile owners for something which would renew and brighten up the worn and faded tops of their machines. It is easily applied by the amateur, and the beautiful results produced are the best possible. It has excited so much interest

owners, and car owners are invited to consult the advertisement on another page of Hess & Son, 1215 Filbert Street, Philadelphia, Pa., and then write for literature and price of this time-saving preparation.

Pitner Pump.—This pump is manufactured by the Pitner Pump Company, 1214 Michigan Avenue, Chicago, Ill., and the manufacturers state it is 98 per cent. efficient. It is guaranteed for five years, and, as the price of the pump is only \$5, this means to the purchaser only the cost of a dollar a year. The company prefers to have our readers buy of their dealers, but if your dealer does not carry this pump, write direct to the company at the above address, for any further particulars you may desire or send your order direct. The pump will be sent on ten days' trial and money refunded if not satisfactory.

Sterling Black Brass Enamel.—This preparation is said to impart a beautiful lustrous ebony black finish to brass auto

territory included in Lincoln, Columbia, Richmond, Warren, Jefferson, Glasscock, Washington and Jenkins counties, Georgia and Edgfield, Aiken and Barnwell counties, South Carolina; the Euclid Oil Company, 1906 Euclid Avenue, Cleveland, Ohio, for the territory included in northeastern Ohio, Cleveland, Akron and Youngstown, and the James Gray Kuhn Company, 5712 Pennsylvania Avenue, Pittsburgh, Pa., for the territory within a radius of sixty miles from Pittsburgh.

Demagnetization of Magneto Magnets.

Demagnetization of magnets of a magneto has caused, of late, much puzzled comment. The answer is simple. A magneto can be demagnetized, but this trouble will seldom, if ever, occur if the maker's instructions are properly followed in making connections.

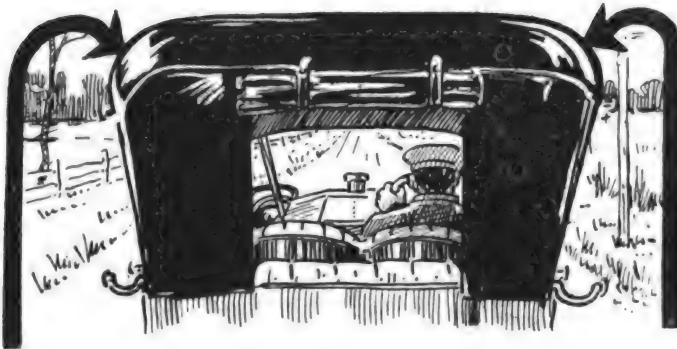
Demagnetization is usually caused by passing the battery current through the magneto windings. This, almost invariably, is the result of improper installation of the wiring.

Some makers of magnetos use the colored wire cable scheme. With this method it is practically impossible for the installer to go wrong, it being only necessary to connect each colored wire cable to the corresponding colored binding post.

Tobey's Rim Remover.—This tool is manufactured by William L. Tobey, 12 Lewis Street, East Boston, Mass., and is said to save time, labor and much trouble. If your dealer does not sell it, write direct to Mr. Tobey. But consult his advertisement on another page and write to him for further particulars.

Connecticut Distributes Handsome Banner.

The Connecticut Shock Absorber Company, of Meriden, Conn., are distributing a handsome wall banner which is worthy of special mention. This banner portrays a charming young lady and also gives an excellent illustration



that we have received inquiries for it from every State in the Union, as well as Porto Rico, the Philippine Islands, Canada, and Mexico. Old cloth or mohair tops which show signs of wear can be made as good as new in a very short time, thus affording not only great satisfaction, but a great saving in expense if a new top had to be purchased. Sample cards gladly sent on request. Write direct to the manufacturers, Felton, Sibley & Company, 136-140 N. Fourth Street, Philadelphia, Pa., and mention this magazine.

"Minor Repairs and the Care of Tires."

—This is the title of a little booklet just brought out by the Firestone Tire and Rubber Company, Akron, Ohio. It tells the motorist how to make repairs on his tires and inner tubes, and contains many suggestions on the care and preservation of tires, in order to get the utmost service out of them. We understand that a copy of this booklet will be sent free of charge to any reader who will take the trouble to write for it and mention this paper.

The Hagstrom Brothers Manufacturing Company of Lindsborg, Kansas, have recently added to their factory a department for the manufacturing of dies, tools, special machinery, and model making. They will also attend to perfecting patents and do contract work. Their equipment is ample for turning out this class of work. It will be remembered that formerly they confined themselves to the manufacture of rim cut blowout patches, spark plugs, and inner liners.

"Tinol."—This is a combined solder and flux from which it is said perfect soldering can be done by anybody with very little practice. Dealers, garage

lamps, radiators, wind shields, horns, and all trimmings. See advertisement of the Sterling Polish Company, Sterling, Ill., in our Want Department.

Reliners.—The Gray Specialty Company of Newark, N. J., have an announcement in this issue of their new reliners. These reliners are the result of careful experiments on the part of F. A. Gray, and he claims that tire bills can be cut in half by their use. He says if a proper fitting and properly-made reliner be used, it is cheaper to run a tire until it is completely worn out than to effect adjustments. Tires should be kept pumped up to their fullest capacity. The Gray reliners are covered by an absolute guarantee and the offer is exceptionally interesting as to prices. Special sizes can be made to order for taxicab companies. Write to manufacturers as above for further particulars.

Multibestos Brake Lining.—Agencies for the sale of this lining have recently been opened as follows: Standard Woven Fabric Company, 903 Boylston Street, Mass.; A. L. White, Mgr.; Flint & Chester, 237 Lafayette Street, New York City; Fred E. Holmes Company, 1508 Woodward Avenue, Detroit, Mich.; F. E. Sparks, 1430 Michigan Blvd., Chicago, Ill.; Fred. Ward & Son, Inc., First & Howard Streets, San Francisco, Cal.; A. L. Richtmyre, 525 Delaware Street, Kansas City, Mo. Other agencies will be established later on.

New Havoline Oil Agents.—The Havoline Oil Company, 17 Battery Place, New York City, announces the appointment of the following new agents: W. A. B. Worley of Jacksonville, for the Florida territory; Augusta Overland Motor Car Company of Augusta, Ga., for the

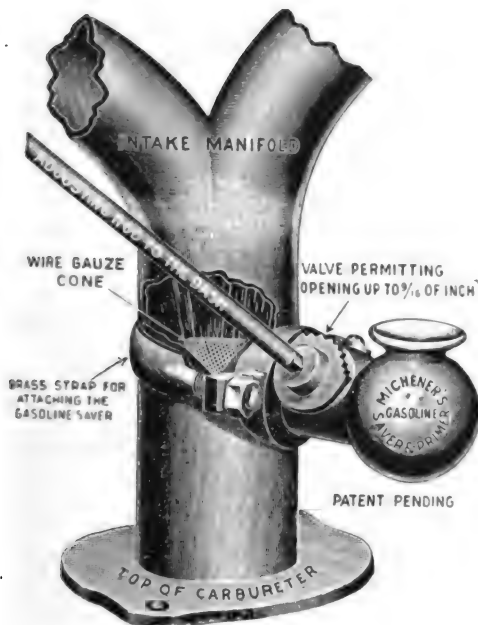


of the Connecticut shock absorber. This banner is in six colors, measuring 22 inches x 28 inches, and will be mailed to any dealer or garage upon request. A reproduction of the banner is shown herewith.

Subscribe to the "Automobile Dealer and Repairer," \$1.00 Per Year.

A Gasoline Saver.

The modern carburetor, although a marvel of automatic flexibility, has to be adjusted so that all speeds will be equally well taken care of. If the carburetor were set so that the highest



Michener Gasoline Saver.

possible efficiency were obtained at high speeds it would probably be impossible to start the engine. One of the most important factors is getting the gas into the cylinders with the least possible resistance, but by using this device, you can reduce the air resistance to a minimum, without sacrificing the starting or low speed adjustment; also, compensation for altitude is easily made without disturbing the normal air adjustments of the carburetor. High altitudes reduce the air taken in per stroke because of the low barometric pressure, and consequently an over-rich mixture is the result.

To remedy these imperfections, the Michener Gasoline Saver has been invented. This breaks up and re-mixes the gasoline globules with a spray of air, increases the power, and saves gasoline.

It is well understood that a mixture of gasoline and air correctly proportioned to develop the greatest possible power under heavy loads, in the engine, is too rich for light loads. This not only causes a waste of fuel, but also causes unnecessary deposit and heating of the jacket water. To be continually changing the adjustment of the carburetor in order to prevent waste of gasoline, on one hand, and to develop a maximum of power on the other, is impracticable and inconvenient.

By means of the Michener Gasoline Saver, you can correct the mixture to all conditions of load and speed by simply turning a small lever on the dash as you drive along, without disturbing the carburetor adjustments. It is simply a hand-controlled device for admitting auxiliary air above the carburetor. Its opening is from the smallest up to 9-16ths of an inch.

It is also useful for priming when the motor is hard to start. Price, with connections, \$5.00. In ordering state the

side of the motor the carburetor is on. Address E. S. Michener, New Castle, Pa., and mention this magazine.

Autoline.—Dealers are invited to consult the advertisement in this issue of Wm. C. Robinson & Son Company, manufacturers of "Autoline." Write today to Dept. 2, and they will tell you how to sell Autoline, and give you particulars and special terms they are willing to make. Perhaps you had better write for their booklet entitled "How to Use Autoline," to the Wm. C. Robinson & Son Company, 1509 Thames Street, Baltimore, Md.

Tire Clips.—The Draver Manufacturing Company, of Richmond, Ind., have a brief announcement in this issue, descriptive of their "Tire Clips." These clips are made to use in connection with quick detachable clincher type tires. They hook over the beads and hold the parts in position. They are made of light spring steel and copper plated to prevent rusting and are made to fit any size of tire. But consult the advertisement on another page and write to the company as above for further particulars.

C. S. Mendenhall, 39 Opera Place, Cincinnati, Ohio, publisher of road maps and guides, wishes us to state that in April he will issue the following maps: Iowa, \$1.00; Eastern Kansas, \$1.50; Eastern Tennessee, \$1.50; Virginia, \$1.50; Vermont, 75 cents; and New Hampshire, 75 cents.

"Tire-Doh."—This preparation is manufactured by the Atlas Auto Supply

TIRES LAST TWICE AS LONG

when car is jacked up off garage floor with Moore Tire Saving Jacks. There's no stoop—no strain necessary to jack up the heaviest touring car.

MOORE TIRE SAVING JACKS

double the life of your tires by relieving them of immense weight which bears down at one point on the tire when car is in garage.

Lift starts with lever at right angle. Jack up heaviest car in 30 seconds. Instantly applied—just slip loop over hub and push down lever. Fit any hub. Price per set of four, \$6.50, freight prepaid.

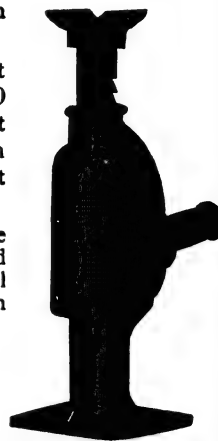
Lifting Jacks: We make a complete line. They're strong—have rapid and easy lift—simply constructed—will stand a tremendous amount of strain and pressure.

Accessory Supply Dealers: Write today for prices on complete line.

J. C. Moore & Co.

306 Wisconsin St.

Racine, Wis.



Company, 77 East Adams Street, Chicago, Ill. See full-page announcement in this issue. They want our readers to try it at their risk and if it does not do exactly what they claim for it, they will refund the money. But consult the advertisement of this company on another page and learn full particulars regarding this preparation and its advantages.

Electric Welding.—The Hub Machine Welding & Contracting Company, 621 Cherry Street, Philadelphia, make a specialty of welding broken parts of all kinds, such as aluminum cases, cracked cylinders, exhaust pipes, etc. They design and build special machinery for the general automobile repair shops. All their work is absolutely guaranteed. Write at once for booklet giving full particulars of the work they do. If any of our readers are unfortunate enough as to have parts of their automobile, consisting of cast iron or aluminum, broken it will pay them to communicate with this company before throwing the parts away and buying new ones. New parts cost so much money there is a distinct advantage in having the old parts repaired.

Harrison's Agalite Lubricant.—In this issue will be found the advertisement of the Harrison Agalite Lubricating Company, Syracuse, N. Y. The manufacturers say that it has been used in a transmission case and at a temperature of 40 degrees below zero, and that the lubricant flowed perfectly at this low temperature. The manufacturers would like to give our readers, who may be interested, full particulars concerning this lubricant.

Automatic in Action

SAGER SHOCK ABSORBERS

Have proven for seven years to be mechanically correct
Prevent recoil and bumping of springs; thereby reducing
car maintenance to a minimum.

60 DAYS FREE TRIAL

ONE YEAR GUARANTEE

Regular equipment on Saurer, Kissel Kar,
Lippard-Stewart and Franklin Trucks

ENDORSED BY THESE PROMINENT MANUFACTURERS

OLDSMOBILE

"The 'Sager Device' presents advantages not found in other so-called 'shock absorbers.'"

Olds Motor Works.

ELMORE

"We are entirely satisfied with them."

Elmore Mfg. Co.

PIERCE-ARROW

"They make Pierce Cars ride like a cushion"

S. K. Pierson.

CRAWFORD

"They add greatly to comfort and reliability."

Crawford Automobile Co.

LOGAN

"We find them indispensable."

Logan Construction Co.

DORRIS

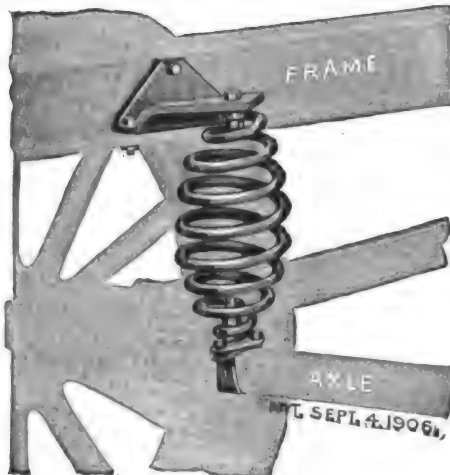
"Our customers are more than satisfied with them."

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"Certainly they are an improvement over anything which the writer has tried."

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"Your Springs make the car more substantial and easier to ride in, and make motoring a pleasure."

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S. V. Tire Saver Outfit, \$1.

S. V. Tire Saver Outfit is made by the Williams Manufacturing Company, Eighteenth & Carman Streets, Camden, New Jersey. It consists of one can of S. V. rubber cement; one can of S. V. rubber putty; one S. V. tire plaster (casing patch), one piece of emery cloth, and a book of instructions. S. V. rubber cement and S. V. rubber putty are self vulcanizing and heat proof; features that commend them to automobile owners. With an S. V. Tire Saver Outfit you can repair tubes and casings without heat-



ing, tools or vulcanizing; your hands do the work. Just clean the cut with gasoline; apply S. V. rubber cement and let dry for five or ten minutes, then kneed in enough S. V. rubber putty to fill in the cut, and the repair is complete and permanent. S. V. Tire Saver Outfit is guaranteed. The Williams Manufacturing Company will promptly refund money to any purchaser who buys an outfit and is not satisfied with it. Price of outfit, \$1.

The American Reliner.

It is claimed by the manufacturers that they have a reliner that will not creep, heat, or pinch the tubes, and it is guaranteed perfect in every way in workmanship and material. Here are some of the reasons given for its use: It is made of the best Sea Island fabric. It will reinforce the casing. It will give from one to three thousand more mileage out of your tire. It will not burn your inner tube. The second ply of fabric is not over one-quarter of an inch from the edge. The third ply of fabric is not over one inch from the edge. It is then as strong at the sides as it is anywhere else. It is so easy to fit. It stands with a guarantee. It will eliminate eighty per cent. of your punctures. It is made like the casing and fits the same perfectly. For prices, address the American Rubber Products Company, 24-30 South Clinton Street, Chicago.

We learn that H. M. Swetland, formerly President of the Class Journal Company was recently elected Chairman of the Board of Directors of Wyckoff, Church & Partridge, Inc., 1743 Broadway, New York City. Mr. Swetland has large experience and will undoubtedly prove of great value to the organization with which he is now connected. This company makes a specialty of commercial trucks and Guy Vaughan cars.

To Dealers.—The announcement on another page of the Dayton Engineering Laboratories Company of Dayton, Ohio, should interest every dealer who is a reader of this paper. It shows how they can make money selling Delco Apparatus; but consult their advertisement and write for special terms, mentioning this paper. Special territory will be given to those dealers who apply promptly.

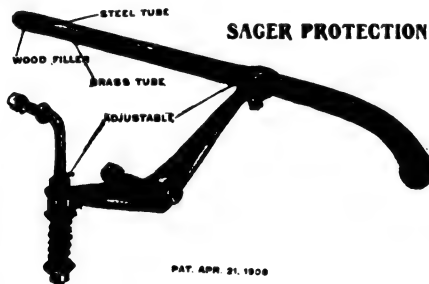
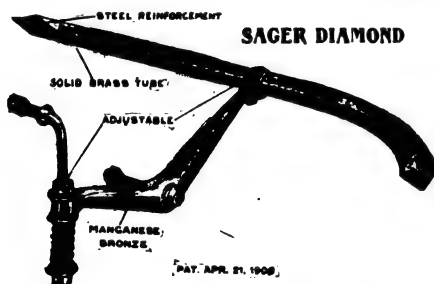
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Simply remove a Spark Plug from any convenient cylinder and substitute the pump (with the hands only) is the advantageous method of attaching to all motors.

The cylinder used doesn't fire, therefore any spark plug can be utilized with either dual or single ignition system. If so desired, a valve cap may be tapped out and fitted with a permanent pet-cock, making it unnecessary to remove a spark plug in using.

The pumps work equally well on all sized cars, from the smallest Ford to the largest Lozier.

After connecting the hose from pump to tire, motor should be started and run on low throttle from two to four minutes, depending on the size of tire—maximum pressure obtainable, 150 pounds.



The pump is noiseless in operation and requires no attention whatever, other than an occasional drop of oil.

This pump is designed on a compound principle, **PURE, FRESH AIR** which is liberally supplied by the intake air valve being compounded to high pressure into the small barrel and thence forced to the tire.

The construction is simple and mechanically perfect throughout with no wearing parts to give trouble or get out of order. **Just like your engine, with metal rings—built to last as long as your car.**

Our Design makes this Pump Absolutely Indestructible. The pumping piston only operates when motor is run on low throttle and automatically locks when the engine is raced; again operating when the throttle is lowered.

An article that is small, light, compact, weighing only two and one-half pounds, which can be carried anywhere—always in working order and ready to use.

Our Selling Plan enables you to try this pump on your own car before purchasing. Furnished with adapters to fit any car and complete with 12 feet of superior hose and connections. **PRICE (Pressure Register \$2.00 extra), \$10.00**

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Varnish and Soap.—The automobile handed difficult problems to the varnish maker. Mud and dirt could be coped with, but mud, oil and grease were an equation hard to solve when the chassis was covered with the three. No varnish has been compounded that could itself stand the soap-suds that were needed to clean the chassis of the grease, so nothing would "stand up." You must have soap with a good mordant if you want to cut away the grease, but it likes the oil in the varnish just as well, as all oils look alike to such soap.

To compound a chassis varnish that would surmount these "troubles" was an achievement, and Valentine & Company have done it and tell all about it in a booklet. The whole Vanadium family of varnishes made by the company are very remarkable as a step in advance in the

art of varnish making, but this Vanadium chassis varnish is an epoch-maker, and is the something new the painter will prick up his ears about; hence, we are doing all the fraternity a service by calling attention to the series of freely-given away booklets the company sends on application. These can hardly come under the head of advertising effort, as the issue is more educational and informing. The reader is asked to think about it, experiment with it, and try out the claims made.

For this very instructive book, address Valentine & Company, 257 Broadway, New York, and mention this journal.

The Hagstrom Brothers Manufacturing Company of Lindsborg, Kansas, have recently appointed the Lowe Motor Supply Company of New York City as distributors of their goods. This company

has also recently taken over the entire business of the Cataract Auto-Vehicle Washer Company of Topeka, Kansas, and are sole distributors of the Cataract Washer. It is said to be a saver of time, water and money. We understand that P. E. Zimmerman has superseded N. J. Thorstenberg as manager of the Hagstrom Brothers Manufacturing Company.

Champion Spark Plugs.—The manufacturers of this spark plug, the Champion Spark Plug Company, Dept. "F," Toledo, Ohio, desire to say that the trade-mark shown at the top of their full-page announcement in this issue appears on every spark plug they make, and the name "Champion" is plainly marked on the porcelain. Write for further details concerning this excellent plug.

WANT ADVERTISEMENTS.

Under this head will be printed advertisements of shops for sale or to rent, or shops wanted, or situations or help wanted, or tools or machines (second-hand) wanted or to exchange, at the uniform price of three cents a word, which will include the address for each insertion, payable in advance. No advertisement will be inserted for less than 50 cents, however small.

Remittances can be made in postage stamps, if more convenient. Address,

MOTOR VEHICLE PUBLISHING CO.,
71-73 MURRAY STREET, NEW YORK.

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PATENTS SECURED.—C. L. Parker, Patent attorney, 962 G Street, Washington, D. C. Inventor's handbook upon request.

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FOR SALE.—"Steam Car Owners." Myers Kerosene Burner—Something new. Send for circular. 729 West Colfax, Denver, Colorado.

TIRES.—Another big sale on: 10,000 Goodriches, Michelins, Diamonds, etc., at unheard of reductions. Every size for every rim. Guaranteed. Shipped on approval. Also 5,000 Motor Cycle tires. Sacrificed. The Automobile and Cycle Company, 1769 to 1787 Broadway, New York City.

TOPS.—Until further notice, runabout top \$22, touring car tops \$35. C. G. Meyer & Son, Tiffin, Ohio.

"SOME RARE BARGAINS, which we purchase from manufacturers' surplus stock. All goods warranted first-class and if not satisfactory, you can return to us and purchase money will be refunded. Mohair touring car tops, \$13.50; roadster, \$12.50; fine tire covers, \$1.00 each; trunk racks, \$1.00; robe rails, \$1.00; foot rails, \$1.00; rumble seats, upholstered and painted, \$10.00; Gemmer steering gears, \$13.50; Ford model "T" radiators, \$13.00; gas tanks, \$12.00. Autoparts Mfg. Co., Detroit, Mich."

CYLINDERS REGROUND, and fitted with new pistons and rings for \$15.00 per cylinder. We make parts and cut gears of all kinds. Send us your old parts and we will repair or duplicate them in record time. Cracked cylinders, gear cases, etc., welded and made good as new. Aluminum, bronze and brass castings of every description. Phosphor bronze bushings in the rough carried in stock. Address, The Adapt Machinery Company, 1624 Wabash avenue, Chicago, Ill.

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NEW 32x3 Tires at \$8.00. New 32x3 Tubes at \$1.80. Warranted first-grade Morgan & Wright. G. & J. and Hartford make. New Mohair Tops at \$12.50 each. Complete with curtains. Will fit all makes of cars. \$25.00 Gas Tanks at \$12.50. Just a few of our bargains. We have more in lamps, etc. Autoparts Mfg. Co., 441 Twombly ave., Detroit, Mich.

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TIRES, new Diamond, 36x4 in., Q. D., firsts only, 15 on hand, \$27.00. Carburetors, new Kingston floating ball, single adjustment, 1½ inch vertical intake with extra flange connection, \$5.50. Carburetors, same as above, slightly used but perfect, \$3.00. New pressed steel frames, 34x147 in., \$10.00. Carburetors, Maximus and new Kingston Type C, \$2.00. New front axles, complete with hubs, hub caps, bearings, steering rods, etc., to fit above frames, \$12.00. Mufflers, \$4.50. 30x3½ in. wheels with Clincher rims, \$2.50. 34x4 in. wheels with Marsh Q. D. rims, \$4.00. Clincher rims, 36x4, 36x5, 40x4, 75c. New timers, Heinze, Splittdorf, etc., 1, 2 and 4 cylinder, \$2.75. Zig-Zag wind-shields, complete, \$10.50. Radiators, 50 h.p., slightly used, \$20.00. Radiators, new 40 h.p. honeycomb with hood, \$35.00. Oilers, 4 feet McCord force feed, \$3.50. Oilers, 4 feed Neely force feed, \$3.00. Round gasoline tanks, double compartment, 12x30 in., \$2.50. Gasoline tanks, 11x11x31½ in. and 7x14x31½ in., \$1.75. Rumble seats, upholstered and painted, \$8.50. Double bucket roadster seats, upholstered and painted, \$27.50. Exhaust horns, all sizes, \$1.75. Motors, new Milwaukee, 4 cyl., 40 h.p., 4½x5¼ in., complete, \$225.00. Magnetos, new Splittdorf Model T, complete with coil, four-cylinder, \$35.00. Magnetos, new Pittsfield high tension, 4 cyl., \$30.00. Get our big list. Automobile Appliance Co., 1712 Michigan Ave., Chicago, Ill.

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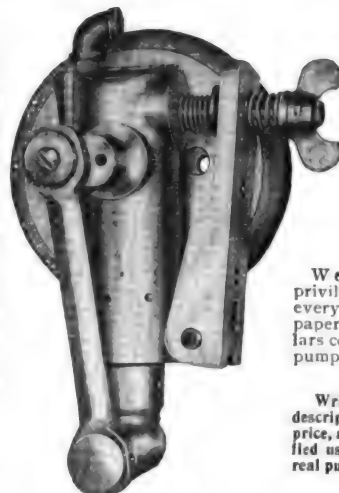
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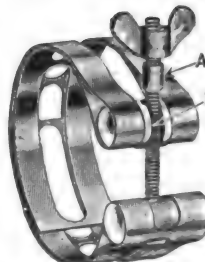
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Index to Advertisers.

Adamson Mfg. Co., vulcanizers.....	18	Gun Metal Finish Co., polish.....	100	Smart, A. J. Mfg. Co., screw plates....	24
Alden Sampson Mfg. Co. (Sampson) automobiles.....	83	G. J. G. Motor Car Co., automobiles.....	26	Spengler Optical Co., timers.....	30
Alden Sampson Mfg. Co. (Sampson) (35) automobiles.....	83	Hagstrom Bros. Mfg. Co., spark plugs.....	120	Splittorf, C. F., magnetos.....	100
Allen Auto Specialty Co., tire gauges.....	107	Harris, A. W., Oil Co., oil.....	102	Standard Oil Co., oil.....	Front cover
American Battery Co., storage batteries.....	83	Harrison's Agalite Lubricating Co., lubricant.....	89	Standard Tire Protector Co., treads.....	109
American Bolt & Screw Case Co., revolving cases.....	27	Hart & Widder Co., pumps.....	26	Standard Woven Fabric Co., brake band lining.....	16
American Electric Co., signals.....	100	Harvey Chemical Co., polish.....	26	Star Speedometer Co., speedometers.....	96
American Rubber Products Co., tire lining.....	12	Havoline Oil Co., oil.....	32	Steam Carriage Boiler Co., boilers.....	96
American Tap & Die Co., screw plates.....	105	Haws, Geo. A., oil.....	8	Stoddard-Dayton, automobiles.....	83
Armiger Chemical Co., polish.....	113	Haywood Tire & Equipment Co., vulcanizers.....	93	Stryker, C. W., cutouts.....	89
Arsenal Varnish Co., varnish.....	28	Heath Foundry & Mfg. Co., grinders.....	20	Superior Motor Specialty Co., spark plugs.....	100
Atlas Auto Supply Co., repair outfits.....	91	Hess & Son, solder.....	27	35 Per Cent. Automobile Supply Co., supplies.....	81
Atlas Chain Co., tire chains.....	106	Hess-Bright Mfg. Co., ball bearings.....	13	Times Square Automobile Co., automobiles.....	30
Atwater Kent Mfg. Works, ignition.....	75	Hickok Mfg. Co., monograms.....	101	Tingley, C. O. & Co., patches.....	104
Auburn Auto Pump Co., pumps.....	94	Hinckley Machine Works, milling attachments.....	102	Tobey, Wm. L., rim removers.....	104
Automobile & Accessories Mfg. Co., turntables.....	24	Hodge & Graves Co., automobile seats.....	88	Toledo Auto Devices Co., putty.....	101
Automobile Advertising Co., advertising service.....	6	Hollingshead, R. M., Co., supplies.....	87	Triple-Tread Mfg. Co., treads.....	23
Automobile Supply Mfg. Co., signals.....	98	Holt & Beebe Co., lamps.....	97	Troy Auto Specialty Co., pumps.....	93
Automobile Tire Co., tires.....	22	Holzman Auto Supply Co., supplies.....	3	Tryon Auto Pump Co., pumps.....	25
Autoparts Mfg. Co. (Jersey City, N. J.), spark plugs.....	95	Horsey Mfg. Co., patches.....	22	Tuthill Spring Co., springs.....	100
Auto Directories Co., mailing lists.....	97	Hub Machine Welding & Contracting Co., welding.....	94	Tuxedo Tire Exchange, tires.....	83
Auto Parts Mfg. Co. (Milwaukee, Wis.), supplies.....	18	Hudson Motor Car Co., automobiles.....	100	20th Century Tire Protector Co., treads.....	18, 103
Auto Parts Co. (Providence, R. I.), supplies.....	73	Inner Shoe Tire Co., tire lining.....	7	Underwood, H. B. & Co., cylinders re-bored.....	113
Auto-Tire Vulcanizing Co., vulcanizers.....	16	Inst. Lighter Co., ignition.....	93	United States Motor Co., automobiles.....	83
Baldwin Chain & Mfg. Co., chains.....	28	Jeffery-Dewitt Co., spark plugs.....	105	United States Tire Co., tires.....	119
Barnes Drill Co., lathes.....	97	Johns, H. W., Manville Co., asbestos fabrics and specialties.....	27	Universal Fluxine Co., solder.....	100
Barnes, W. F., & John Co., lathes.....	110	Jones, Phineas & Co., wheels.....	89	Universal Tire Protector Co., treads.....	104
Benford Mfg. Co., timers and spark plugs.....	2	Kellom, Chas. F. & Co., oil.....	98	Utter Company, tags.....	88
Best Ignition Equipment Co., spark plugs.....	32	Keystone Tire & Rubber Co., tires.....	22	Vacuum Oil Co., oil.....	71
Blackledge, John W., Mfg. Co., springs.....	26	Kimball Tire Case Co., treads.....	102	Valentine & Co., varnishes.....	15
Blake Spark Plug Co., spark plugs.....	99	King Top Mfg. Co., auto tops.....	110	Vanderpool, W., tires.....	96
Blickensderfer, G. C. Co., spark plugs.....	30	K. W. Ignition Co., magnetos and spark coils.....	108	Vanguard Mfg. Co., wind shields.....	96
Borbein Auto Co., bodies.....	94	K. & W. Mfg. Co., tire lining.....	4th cover	Voorhees Rubber Mfg. Co., tire lining.....	83
Brennan Motor Mfg. Co., motors.....	89	Lansing Co., turntables.....	88	Waban Webbing Co., tire lining.....	90
Bricton Mfg. Co., treads.....	3d cover	La Porte Carriage Co., automobile seats.....	88	Waterbury Welding Co., welding.....	112
Brilliant Gas Lamp Co., gasoline lighting system.....	100	Leader Mfg. Co., vulcanizers.....	20	Western Automobile Supply Co., inner casing.....	99
Brooklyn Machine Co., timer brackets.....	97	Leather Tire Goods Co., treads.....	1	Western Motor Co., motors.....	96
Brown Co., pumps.....	112	Livingston Radiator & Mfg. Co., radiators.....	82	Western Robe Mills, buggy washers.....	25
Brush Runabout Co., automobiles.....	83	Lockwood-Ash Motor Co., spark plugs.....	96	Western Welding & Mfg. Co., welding.....	104
Buffalo Forge Co., tools.....	31	McIntyre, W. H. Co., automobiles.....	96	Whittaker Chain Tread Co., tire chains.....	100
Butterfield & Co., screw plates.....	26	McLain, H. E., & Co., tire chains.....	88	Wiley & Russell Mfg. Co., screw plates, tools.....	100
Huob & Scheu, auto tops.....	96	MacKae Mfg. Co., terminals.....	105	Williams Foundry & Machine Co., repair outfits.....	14
Canton Foundry & Machine Co., turntables and jacks.....	107	Mahoney, Dr. W. F., paint.....	26	Williams, J. H. & Co., drop forgings.....	10
Cartercar Co., automobiles.....	114	Marshall Oil Co., oil.....	118	Williams Mfg. Co., repair outfits.....	89
Catalain, A. G., hose clamps.....	83	Martin, L. G., cement.....	89	Winchester Machine Works, tools.....	110
Champion Blower & Forge Co., tools.....	25	Marvel Carburetor Co., carburetors.....	88	Woven Steel Hose & Rubber Co., brake band lining.....	100
Champion Spark Plug Co., spark plugs.....	77	Maxwell-Briscoe Motor Co., automobiles.....	83	Zacharias, E. H., motors.....	104
Clarke Carter Automobile Co., automobiles.....	83	Mayo Mfg. Co., pumps.....	81		
C. M. B. Wrench Co., wrenches.....	30	M. & M. Mfg. Co., repair outfits.....	24		
Colorado Tire & Leather Co., treads.....	29	Mendenhall, C. S., road maps.....	96		
Columbia Motor Car Co., automobiles.....	83	Metallic Automobile Matting Co., matting.....	83		
Comstock, Geo. S., compressors.....	88	Meteor-Auto Tank Co., tanks.....	97		
Connecticut Shock Absorber Co., shock absorbers.....	95	Michener, E. S., carbon remover.....	11		
Connecticut Telephone & Electric Co., ignition.....	88	Miller, Chas. E., vulcanizers.....	110		
Conover & Robinson, wind shields.....	88	Millwaukee Bronze Casting Co., lamps.....	88		
Courier, automobiles.....	83	Model Gas Engine Works, motors.....	12		
Cray Bros., supplies.....	101	Modern Automobile Appliance Co., steering device.....	83		
Crone, F. G., pumps.....	88	Moore, J. C. & Co., jacks.....	79		
Crown Mfg. Co., polish.....	100	Morris, R. W. Mfg. Co., polish.....	103		
Curtis & Co., Mfg. Co., pumps.....	29	Mosler, A. R. & Co., spark plugs.....	83		
Davies, J. P. Co., soap.....	8	Motor Accessories Makers, Inc., cement.....	100		
Dayton Engineering Laboratories Co., ignition.....	16	Morse, Frank W., automobile specialties.....	30		
Dayton Inner Tire & Mfg. Co., tire lining.....	24	Motor Car Rubber Buyers, tires.....	83		
Dayton Motor Car Co., automobiles.....	100	Motz Tire & Rubber Co., tires.....	95		
Delta Mfg. Co., spark plugs.....	100	National Illustrating Co., publication.....	83		
Diamond Rubber Co., tires, tire stock.....	106	National Motor Supply Co., vulcanizers.....	69		
Double-Fabric Tire Co., tire lining.....	111	National Sales Corporation, brake band lining.....	100		
Dover Stamping & Mfg. Co., funnels.....	31	National Welding & Mfg. Co., welding.....	96		
Draver Mfg. Co., cable supports.....	110	New York Coil Co., Ignition.....	101		
Duryea, Chas. D. & Co., automobiles.....	83	New York & New Jersey Lubricant Co., oil.....	117		
Edelmann, E. & Co., tire gauges.....	27	Northwestern Chemical Co., cement.....	113		
Edgar Mfg. Co., signals.....	100	O'Neill Tire & Rubber Co., vulcanizers.....	28		
Empire Tire Co., tires.....	28	Packard Electric Co., ignition cables.....	104		
Essex Rubber Co., tire lining.....	90	Page Lester Co., repair outfits.....	93		
Esterline Co., Ignition.....	112	Peerless Accessories Mfrs., pumps.....	106		
Excelsior Tire Co., tires.....	10	Peerless Cement Co., repair outfits.....	96		
E-Z-2-Work Steam Vulcanizer Co., vulcanizers.....	120	Perfect Mfg. Co., vehicle washers.....	88		
Felton Sibley & Co., varnishes.....	21	Phillips-Laffitte Co., brazing compounds.....	89		
Firestone Tire & Rubber Co., tire stock.....	115	Pitner Pump Co., pumps.....	20		
Fisher & Norris, vises.....	26	Planhard Mfg. Co., carburetors.....	104		
Garage Equipment Mfg. Co., supplies.....	97	Porter, H. K., bolt clippers.....	96		
Garden City Spring Works, springs.....	88	Prest-O-Lite Co., tanks, tubes.....	92		
Gardener Governor Co., air compressors.....	83	Quality Cement Co., cement.....	100		
Garvin Machine Co., tools.....	30	Queen Mfg. Co., treads.....	17		
Geizler Bros., storage batteries.....	88	Racine Auto Tire Co., tires.....	88		
Gem City Liquid Vulcanizers Co., repair outfits.....	29	Randall-Falchney Co., signals.....	103		
Gibney, Jas. L. & Bro., vulcanizers.....	83	Rapid Typewriter Co., typewriting machines.....	99		
Gilmer, Jr., G. Walker, pliers.....	93	Remy Electric Co., magnetos.....	4		
Goodrich, B. F. Co., tires.....	116	Rex Ignition Mfg. Co., spark plugs.....	99		
Grant, H. M., fibre.....	96	Rice & Dayton Mfg. Co., vulcanizers.....	97		
Gray Specialty Co., repair outfits.....	90	Rie Nie Mfg. Co., radiator compound.....	88		
Gray & Davis, lamps.....	9	Robinson, Wm. C. & Sons Co., oil.....	98		
Great American Rubber Co., tires.....	97	Royal Equipment Co., brake band lining.....	88		
Grossman, E. Co., spark plugs.....	2d cover	Sager, J. H., Co., shock absorber.....	80		
Guide Motor Lamp Mfg. Co., lamps.....	14	Sampson, automobiles.....	83		
		Scaife, Wm. B., & Sons Co., gasoline outfits.....	101		
		Schrader's A. Son, tire gauges.....	32		
		Schug Electrical Mfg. Co., storage batteries.....	98		
		Sebastian Lathe Co., lathes.....	20		
		Security Co., patches.....	105		
		Selbach Rubber Co., patches.....	88		
		Seneca Falls Mfg. Co., lathes.....	104		
		Shaler, C. A. Co., vulcanizers.....	19		
		Shannon, T. R., polish.....	83		

Classified Buyers' Guide.

Advertising Service	
Automobile Advertising Co.....	6
Air Compressors	
Gardner Governor Co.....	83
Williams Foundry & Machine Co.....	14
Aluminum Cases Repaired	
Hub Machine Welding & Contracting Co.....	94
Aluminum Welding Composition	
Hub Machine Welding & Contracting Co.....	94
Asbestos Fabrics and Specialties	
Johns, H. W., Manville Co.....	27
Automobiles	
Alden Sampson Mfg. Co. (Sampson 35).....	83
Alden Sampson Mfg. Co. (Sampson).....	83
Brush Runabout Co.....	83
Cartercar Co.....	114
Clarke Carter Automobile Co.....	83
Columbia Motor Car Co.....	83
Courier.....	83
Dayton Motor Car Co.....	83
Duryea, C. D. Co.....	88
G. J. G. Motor Car Co.....	26
Hudson Motor Car Co.....	100
Maxwell-Briscoe Motor Co.....	83
McIntyre, W. H. Co.....	96
Times Square Automobile Co.....	30
United States Motor Co.....	83
Automobile Seats	
Hodge & Graves Co.....	83
La Porte Carriage Co.....	83
Auto Tops	
King Top Mfg. Co.....	110
Ball Bearings	
Hess-Bright Mfg. Co.....	13
Bodies	
Borbein Auto Co.....	94
Boilers	
Steam Carriage Boiler Co.....	96
Williams Foundry & Machine Co.....	14
Bolt Clippers	
Porter, H. K.....	96
Brake Band Lining	
Johns, H. W., Manville Co.....	27
National Sales Corporation.....	100
Royal Equipment Co.....	88
Standard Woven Fabric Co.....	16
Woven Steel Hose & Rubber Co.....	100

Bracing Compounds Phillips-Lafitte Co. 89	Matting Metallic Automobile Matting Co. ... 83	Solder Hess & Son 27 Universal Fluxine Co. 100
Bracing Powders Phillips-Lafitte Co. 89	Milling Attachments Hinckley Machine Works 102	Spark Plugs Autoparts Mfg. Co. (Jersey City, N.J.) 95 Best Ignition Equipment Co. 32 Blake Spark Plug Co. 99 Blickensderfer, G. C. Co. 30 Champion Spark Plug Co. 77 Delta Mfg. Co. 100 Grossman, E., Co. 2d cover Hagstrom Bros. Mfg. Co. 120 Jeffrey-Dewitt Co. 105 Lockwood-Asche Motor Co. 96 Mac Kae Mfg. Co. 105 Mosler, A. R. & Co. 83 Rex Ignition Mfg. Co. 99 Superior Motor Specialty Co. 100
Buggy Washers Western Robe Mills 25	Monograms Hickok Mfg. Co. 101	Spark Plug Terminals Mac Kae Mfg. Co. 105 Morse, Frank W. 105
Bumpers Troy Auto Specialty Co. 93	Motors Brennan Motor Mfg. Co. 89 Model Gas Engine Works 12 Western Motor Co. 96 Zacharias, E. H. 104	Spark Plug Protectors Mac Kae Mfg. Co. 105
Cable Supports Draver Mfg. Co. 110	Non-Conducting Coverings Johns, H. W. Manville Co. 27	Speedometers Star Speedometer Co. 96
Carbon Removers Michener, E. S. 11 Northwestern Chemical Co. 113 Prest-O-Lite Co. 90	Oil Gauges Troy Auto Specialty Co. 93	Springs Garden City Spring Works 88 Blackledge, John W., Mfg. Co. 26 Tuthill Spring Co. 100
Carburetors Marvel Carburetor Co. 88 Planhard Mfg. Co. 104	Oils Harris, A. W., Oil Co. 102 Havoline Oil Co. 32 Haws, Geo. A. 8 Kellom, Chas. F. & Co. 98 Marshall Oil Co. 118 New York & New Jersey Lubricant Co. 117 Robinson, Wm. C., & Son Co. 98, 102 Standard Oil Co. Front Cover Vacuum Oil Co. 71	Steam Packings Johns, H. W. Manville Co. 27
Cement Martin, L. G. 89 Motor Accessories Makers, Inc. 100 Northwestern Chemical Co. 113 Quality Cement Co. 100	Paint Mahoney, Dr. W. F. 26	Steering Devices Modern Automatic Appliance Co. 83
Chains Baldwin Chain & Mfg. Co. 28	Patches Horsey Mfg. Co. 22 Security Co. 105 Selbach Rubber Co. 88 Tingley, C. O., & Co. 104	Storage Batteries American Battery Co. 83 Geisler Bros. Storage Battery Co. 88 Schug Electrical Mfg. Co. 98
Clutches Williams Foundry & Machine Co. 14	Filers Glimmer, Jr., G. Walker 93	Supplies Auto Parts Mfg. Co. (Milwaukee, Wis.) 18 Auto Parts Co. (Providence, R. I.) ... 73 Cray Bros. 101 Garage Equipment Mfg. Co. 97 Hollingshead, R. M., Co. 87 Holzman Auto Supply Co. 3 Morse, Frank W. 30 35 Per Cent. Automobile Supply Co. 81
Compressor Comstock, Geo. S. 88	Polish Armiger Chemical Co. 113 Crown Mfg. Co. 100 Gun Metal Finish Co. 100 Harvey Chemical Co. 26 Morris, R. W. Mfg. Co. 103 Shannon, T. R. 83	Switches Morse, Frank W. 30
Connectors (Hard Rubber) Morse, Frank W. 30	Publications National Illustrating Co. 83	Tags Utter Company 88
Catouts Stryker, C. W. 89	Pumps Auburn Auto Pump Co. 94 Brown Co. 112 Crone, F. G. 88 Curtis & Co., Mfg. Co. 29 Hart & Widder Co. 83 Mayo Mfg. Co. 81 Peerless Accessories Mfrs. 106 Pitner Pump Co. 20 Prest-O-Lite Co. 90 Troy Auto Specialty Co. 93 Tryon Auto Pump Co. 25	Tanks Meteor-Auto-Tank-Co. 97 Presto-O-Lite Co. 92
Cylinders Rebores Underwood, H. B., & Co. 113	Putty Toledo Auto Devices Co. 101	Terminals Mac Kae Mfg. Co. 105
Detachable Treads Leather Tire Goods Co. 1	Radiators Livingston Radiator & Mfg. Co. 82 Rie Nie Mfg. Co. 88	Terminals (Primary and Secondary) Morse, Frank W. 30
Directories Auto Directories Co. 97	Radiators Repaired Livingston Radiator & Mfg. Co. 82	Timer Brackets Brooklyn Machine Co. 97
Drop Frogings Williams, J. H., & Co. 10	Repair Outfits Atlas Auto Supply Co. 91 Gem City Liquid Vulcanizer Co. 29 Gray Specialty Co. 90 M. & M. Mfg. Co. 24 Page-Lester Co. 93 Peerless Cement Co. 96 Williams Foundry & Machine Co. 14 Williams Mfg. Co. 89	Timers Benford Mfg. Co. 2 Mac Kae Mfg. Co. 105 Spengler Optical Co. 30
Electrical Supplies Morse, Frank W. 30 Johns, H. W., Manville Co. 27	Re-Treading Rings Williams Foundry & Machine Co. 14	Tire Chains Atlas Chain Co. 106 McLain, H. E. & Co. 88 Whittaker Chain Tread Co. 100
Fibre Grant, H. M. 96	Revolving Cases American Bolt & Screw Case Co. 27	Tire Gauges Allen Auto Specialty Co. 107 Edelmann E. & Co. 27 Schradler's, A., Son 32
Fire-Proof Cements Johns, H. W. Manville Co. 27	Rim Removers Tobey, Wm. L. 104	Tires Automobile Tire Co. 22 Diamond Rubber Co. 106 Excelsior Tire Co. 10 Empire Tire Co. 28 Goodrich, B. F. Co. 116 Great American Rubber Co. 97 Keystone Tire & Rubber Co. 22 Motor Car Rubber Buyers 83 Motz Tire & Rubber Co. 95 Racine Auto Tire Co. 88 Tuxedo Tire Exchange 83 United States Tire Co. 119 Vanderpool, W. 96
Friction Clutches Williams Foundry & Machine Co. 14	Screw Drivers Mac Kae Mfg. Co. 105	Tire Lining American Rubber Products Co. 12 Dayton Inner Tire & Mfg. Co. 24 Double-Fabric Tire Co. 111 Essex Rubber Co. 90 Inner Shoe Tire Co. 7 K. & W. Mfg. Co. 4th cover Voorhees Rubber Mfg. Co. 83 Waban Webbing Co. 90
Funnels Dover Stamping & Mfg. Co. 31	Screw Plates American Tap & Die Co. 105 Butterfield & Co. 26 Smart, A. J. Mfg. Co. 24 Wiley & Russell Mfg. Co. 100	Tire Kettles Williams Foundry & Machine Co. 14
Gasoline Lighting System Brilliant Gas Lamp Co. 100	Shock Absorbers Connecticut Shock Absorber Co. 95 Sager, J. H., Co. 80	Tire Molds Williams Foundry & Machine Co. 14
Gasoline Storage Outfits Scaife, Wm. B., & Sons Co. 101	Signals American Electric Co. 100 Automobile Supply Mfg. Co. 98 Edgar Mfg. Co. 100 Randall-Faichney Co. 103 Troy Auto Specialty Co. 93	Tire Repair Equipment Williams Foundry & Machine Co. 14
Grinders Heath Foundry & Mfg. Co. 20	Soaps Davies, J. P. Co. 8	Tire Stock Diamond Rubber Co. 106 Firestone Tire & Rubber Co. 115
Hose Clamps Catalan, A. G. 83	Sockets Morse, Frank W. 30	
Ignition Atwater Kent Mfg. Works 75 Connecticut Telephone & Electric Co. 16 Dayton Engineering Laboratories Co. 112 Esterline Co. 93 Inst. Lighter Co. 101 New York Coll Co. 104 Packard Electric Co. 104	Socket and Lighting Outfits Morse, Frank W. 30	
Inner Casing Western Automobile Supply Co. 99		
Jacks Moore, J. C. & Co. 79		
Lamps Gray & Davis 9		
Lamps (side and tail) Guide Motor Lamp Mfg. Co. 14 Holt & Beebe, E. 97 Milwaukee Bronze Casting Co. 88		
Lamps (portable) Morse, Frank W. 30		
Lathes Barnes Drill Co. 97 Barnes, W. F. & John Co. 110 Sebastian Lathe Co. 20 Seneca Falls Mfg. Co. 104		
Lock Washers K.W. Ignition Co. 108 Remy Electric Co. 4, 5		
Lubricants Harrison's Agalite Lubricating Co. 89		
Magnetos Splittdorf, C. F. 100		
Mailing Lists Auto Directories Co. 97		
Maps Mendenhall, C. S. 96		

Tools	
Buffalo Forge Co.	31
Champion Blower & Forge Co.	25
Garvin Machine Co.	30
Wiley & Russell Mfg. Co.	100
Winchester Machine Works	110
Top Dressing (auto)	
Felton, Sibley & Co.	21
Treads	
Brictson Mfg. Co.	3d cover
Colorado Tire & Leather Co.	29
Kimball Tire Case Co.	102
Leather Tire Goods Co.	1
Queen Mfg. Co.	17
Standard Tire Protector Co.	109
Triple-Tread Mfg. Co.	23
20th Century Tire Protector Co.	18, 103
Universal Tire Protector Co.	104
Tops	
Suob & Scheu	96
Tubes	
Prest-O-Lite Co.	90
Turntables	
Automobiles and Accessories Mfg. Co.	24
Canton Foundry & Machine Co.	107
Turntables for Garage	
Lansing Co.	88
Typewriting Machines	
Rapid Typewriter Co.	99
Varnishes	
Arsenal Varnish Co.	28
Felton, Sibley & Co.	21
Valentine & Co.	15
Vehicle Washers	
Perfect Mfg. Co.	88
Vises	
Fisher & Norris	26
Vulcanization	
Johns, H. W. Manville Co.	27
Vulcanizers	
Adamson Mfg. Co.	18
Auto Tire Vulcanizing Co.	16
E-Z-2-Work Steam Vulcanizer Co.	120
Gibney, Jas. L. & Bro.	83
Haywood Tire & Equipment Co.	93
Leader Mfg. Co.	20
Miller, Chas. E.	110
National Motor Supply Co.	69
O'Neill Tire & Rubber Co.	28
Rice & Dayton Mfg. Co.	97
Shaler, C. A. Co.	19
Williams Foundry & Machine Co.	14
Welding	
Hub Machine Welding & Contracting Co.	94
National Welding & Mfg. Co.	96
Waterbury Welding Co.	112
Western Welding & Mfg. Co.	104
Welding by Electricity	
Hub Machine Welding & Contracting Co.	94
Welding Plates	
Phillips-Laffitte Co.	105
Welding Powders	
Phillips-Laffitte Co.	89
Wheels	
Jones, Phineas & Co.	89
Wrenches	
C. M. B. Wrench Co.	30
Mac Kae Mfg. Co.	105
Wind Shields	
Conover & Robinson	88
Grossman, E. Co.	2d cover
Vanguard Mfg. Co.	96
Wind Shield Glass Cleaners	
Grossman, E. Co.	2d cover

The Blake Quick Detachable Plug.—This new spark plug is illustrated in our advertising columns this month for the first time. It has several advantages. A quarter turn of the handle takes the plug out. You don't have to use a wrench or disconnect a wire, and you need not burn or soil your fingers in taking the plug out. The priming cup gets the charge in the right place and the spark points do not have to be adjusted. Costs a trifle more than some plugs, but it has the quality. Every plug is backed by a strong guarantee. Better get a sample, which will be sent postpaid if you will mention this magazine and send \$1.50 to the Blake Spark Plug Company, 100 Concord Street, Cambridge, Mass.

Interlock Inner Tires.—These are manufactured by the Double Fabric Tire Company, 18 East 9th Street, Auburn, Ind., whose full-page announcement will

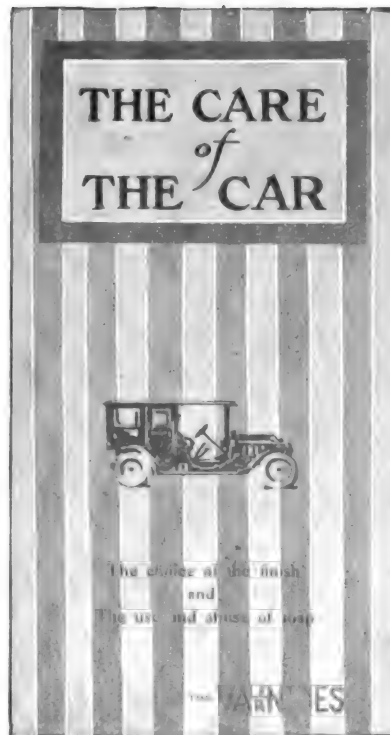
be found in this issue. This company says that its interlock inner tires will positively increase mileage and prevent blowouts and they are fully guaranteed. They have a special proposition to make and would like to hear from our readers who may be interested. Some good territory is still open for wide-awake dealers.

Cheap Advertising

Do you advertise? Are you building up your business by getting after more business in the modern way?

The question whether the automobile shop of moderate size, and employing a painter, can advertise to advantage in its own town by means of the newspapers, or direct by mail promotion work of any kind, is attracting more and more attention. The answer to the question must be that nearly any such concern can use some form of advertising and get results from it.

Advertising in the local town paper often may be had for a few cents an



inch. The only reason why this advertising does not do the work it should is because of the lack of facilities for getting out interesting, snappy, advertising talk. Often a card run from month to month without change is all that the local man uses. Printed announcements, blotters, etc., to be sent to lists by mail and to be handed out are always serviceable, but there is the same difficulty about getting good matter for these that there is in preparing advertisements for the newspapers.

Valentine & Company, the varnish manufacturers, have an idea that, by co-operating with the local man, they can benefit him and themselves at the same time, and they have begun a campaign of advertising service, which is furnished free to any of their customers who desire it. A series of advertising plates for use in local papers, a series of handsome art blotters, imprinted with the local man's name and a series of booklets, are furnished by them. Newspaper ads., blotters and booklets have all been prepared by an expert advertising man with

many years' experience in the varnish business. They contain only an incidental mention of the Valentine line of varnishes and are in every way an announcement of the local man.

This experiment is being watched with considerable interest. The ads. are appearing in local papers all over the country. The blotters are now in preparation, and Valentine & Company announce that they will be glad to send them out to any customer who wants them. The booklets are also ready. The illustration shows the cover of one of these booklets. It will be seen that they are handsomely printed. They are educational in character and are entertaining reading.

Notice to Dealers.—Geo. A. Haws, Pine Street, New York City, manufacturer of Panhard Oil, announces in his half-page announcement in this issue that he wants to make arrangements with dealers everywhere to handle his oil. If you are not already handling this oil, write today for his special proposition. Don't delay.

Gray & Davis, 55 Lansdowne Street, Boston, Mass., in their full-page announcement in this issue, state that they want agents to introduce their lamps and their lighting dynamo system. They are assigning territory, and dealers who may want to handle their goods should apply at once for special terms, addressing their letters to the sales manager. But consult the advertisement of this company on another page.

New Remy Magneto.—It seems hardly necessary to call the attention of our readers to the two full pages in this issue of the Remy Electric Company of Anderson, Ind., with branches in all the big cities. They describe briefly and illustrate their new Type R D Magneto. Our readers should turn to these pages and look them over carefully, and then either go to one of their agencies or write direct to the company for any further information which may be desired.

Sager Shock Absorber.—This shock absorber prevents recoil and bumping of springs, thereby reducing car maintenance to a minimum. It is made by the J. H. Sager Company, 291 South Avenue, Rochester, N. Y. Their advertisement on another page will give further particulars and still more particulars may be obtained by writing direct to the company as above for descriptive circular. This device can be easily attached and the manufacturers have so much confidence in it that they are willing to give a 60 days' free trial and a one-year guarantee.

No-Top-Leak.—L. G. Martin, 3923 Forbes Street, Pittsburgh, Pa., says in our advertising department, if any reader has a leaky mohair top, he can save him money. He says "No-Top-Leak" will make an old top water proof and save \$50 to \$80 for a new one. He offers to refund the money if any reader is not satisfied with results. That seems to be a fair proposition.

The New "Hough" Whistle.—The Auto Improvements Company, of Bristol, R. I., have recently brought out the new "Hough" Whistle for Model "T" Ford cars. This whistle sells at a low price, and the manufacturers describe it as a "peach." It is made of aluminum and is said to have a rich mellow tone that is both loud and pleasing, but write for descriptive circular and particulars if you are interested.

YOUR CAR

To run requires Oil and Grease.

To look well requires Body Polish, Metal Polish and Auto Soap.

Since the use of these products are essential to the utility and appearance of your car, it is logical that it would be good judgement to use the best obtainable.

Whiz Auto Specialties are all that use of materials of quality and practice of the most modern scientific principles renders possible.

Each of our products is formulated expressly for automobile use, and not adapted from a foreign purpose, as is frequently the case.

These facts apply, not only to our oils and greases, but to every article we manufacture.

WHIZ METAL POLISH, for instance, was not originally blended for use on crude brass work of a general nature, but is prepared from a new formula. This Polish acts **quickly** and **easily** on the superior brass of the modern car.

WHIZ AUTO SPECIALTIES

are, in every sense, 1912 products for the 1912 car.

We want to tell you more about them, and **you owe it to yourself, and to your car, to permit us to do so.**

We have prepared a little book describing Whiz Auto Specialties, and will be glad to send it to you, together with a sample of Whiz Metal Polish, if you will give us the name of your Supply Dealer.

Please ask for booklet "R", a postal card will bring it.

THE R. M. HOLLINGSHEAD COMPANY

BOX 3344

CAMDEN, NEW JERSEY

“Why Let the wet rain penetrate your Auto Top and wet your hat?

RieNie Mohair Top Water-Proofing will fix your weather-worn leaky Mohair Top with one coat. Dries over night. Sample can for one top, prepaid; \$2.50.

RieNie Hard Rubber Air Drying Enamel dries over night with a High Gloss finish as good as any baked Japan. A sample will convince you. Prepaid, \$2.50.

German Radiator Compound

Should a man pay \$5 or \$10 to have his radiator Soldered? Our sample can will fix at least 3 leaks. Prepaid 75c. Guaranteed.

We manufacture enamels for brass fixtures and cylinders in several colors, both air drying and for baking. Send for Catalog A.

RieNie Manufacturing Co.
Minneapolis, Minn. U. S. A.

“THE CHAIN THAT LASTS”



The “BEST” Traction Chain

What wears out first on your chains?

Let us tell you why ours last longer than others.

H. E. McLAIN & CO., 162 POND ST., NATICK, MASS.

PACIFIC COAST AGENT

JOHN F. REVALK, 405 Golden Gate Avenue, San Francisco, Cal.



Patent Luxury Folding Seats

Made from steel drop forgings; artistic in design and finish; compact, rugged and durable.

A necessity of high grade car equipment.

Write for catalog showing various models.

Hodge & Graves Co.
AMESBURY, MASS.

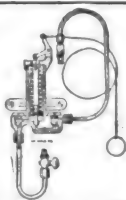
DID YOUR GARAGE MEN EVER FORGET to do all they were ordered to do to a car, or forget to charge every sale or all labor?

USE THE ORDER AND COST TAG.

Scored to tear off stub, both parts numbered.

First Thousand, \$4.50 Every other Thousand, \$3

THE UTTER COMPANY, WESTERLY, RHODE ISLAND



STOP

Cranking Your Auto.

F. G. CRONE,
330 Genesee St.,
Buffalo, N. Y.

DURYEY—Simplicity.



If you are a road user and have not our leaflets, you are unjust to yourself.

C. D. DURYEA CO., SAGINAW, MICH.

GEISZLER NON-SULPHATING STORAGE BATTERIES LIGHTING AND IGNITION

GEISZLER BROS. STORAGE BATTERY CO.

BEST BY 517-520 West 57th Street SEND FOR CATALOG

Automobile Turntables

Every Garage needs one. Write for Catalog R. T. a postal will bring it, it tells all about turntables.

LANSING-COMPANY

Formerly LANSING WHEELBARROW CO.

100 Cedar St., Lansing, Mich.

New York Philadelphia Chicago Kansas City Minneapolis San Francisco



“PERFECT” VEHICLE WASHERS

save labor, water and hose.

CATALOGUE

PERFECT MFG. CO.

ALBANY, N. Y.

The Royal Equipment Company

MANUFACTURERS OF

Raybestos AND Duplex

Brake Lining External Brakes
450 Housatonic Ave., Bridgeport, Conn.

RACINE PURE GUM TIRES

Racine Auto Tire Co., Racine, Wis.

ELECTRIC STAR HEADLIGHTS

Style “D”

Water and Dust Proof. Strongest Auto Lamps Made. Write for Catalog.

Change bulbs without removing front glass.

MILWAUKEE BRONZE CASTING CO.
119 Clinton St., Milwaukee, Wis.

BOREAS “GOD OF THE WIND”

WINDSHIELD

CATALOGUE TELLS

CONOVER & ROBINSON
250 W 54 ST. NEW YORK

LaPorte BODIES

First-class Bodies. Wood or Metal. Furnished in the white or painted and upholstered complete.

LA PORTE CARRIAGE CO., La Porte, Indiana.

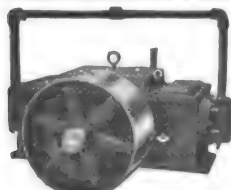
SPRINGS for all Cars

CARBON OR ALLOY STEELS



Established 1872

GARDEN CITY SPRING WORKS, Purple and 20th Sts., CHICAGO, ILL.



Garage Air Compressors

Several sizes and styles especially for garage work. Simple and reliable. Hundreds in use. Also larger sizes.

GEO. S. COMSTOCK,
Mechanicsburg, Pa.

Let Us Show You How

SER-VIS TIRE LININGS

Reduce Your Tire Expense 40%


SELBACH RUBBER CO.,
Atlantic Avenue, Boston, Mass.

You can use Low Grade Gasoline with the “Marvel.”

Marvel Carburetor Company
2225 Alvord St. Indianapolis, Ind.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

\$1.00



\$1.00

Repairs tubes and casings and prevents blowouts. Your hands do the work; at ONE-TWENTYETH the cost of vulcanizing, and in ONE-TENTH THE TIME. Book of instructions with each Outfit.

YOUR MONEY BACK

TRY A TIRE SAVER OUTFIT AT OUR RISK

Send \$1.00 for this **GUARANTEED TIRE SAVER OUTFIT**. If you are not satisfied ask for your Dollar back. It will come promptly.

WILLIAMS MFG. CO., 1810 CARMAN ST., CAMDEN, N. J.

Dealers and Jobbers, Write for Prices.

NO-TOP-LEAK FOR MOHAIR TOPS

If you have a leaking mohair top, I can save you money. A new cover will cost you from \$50 to \$80. One two-pound can of NO TOP-LEAK will cost you \$1.00, and will make your top permanently water-proof. Order now and if you are not convinced that this is the best investment you ever made, I will refund your money for the mere asking.

=====
Send today while you have it in mind.
=====

L. G. MARTIN

3923 FORBES STREET PITTSBURGH, PA.

HARRISONS AGALITE LUBRICANT

Has been operated in a transmission case, by a one-quarter horse-power electric motor, with the temperature 40 degrees below zero. The lubricant flowed perfectly—and there was no appreciable difference in the working of the gears or motor. It has been tested in a temperature of 200 degrees F. It did not melt—it kept the bearings perfectly lubricated.

HARRISONS AGALITE LUBRICANT has three times the viscosity of other lubricants. Consequently it has three times the efficiency—and three times the durability. This makes Agalite the most economical. TRY it.

TERRITORIAL RIGHTS

HARRISONS AGALITE LUBRICATING CO., Inc., Syracuse, N. Y.

Save TIME and MONEY

Automobile Truck Users.

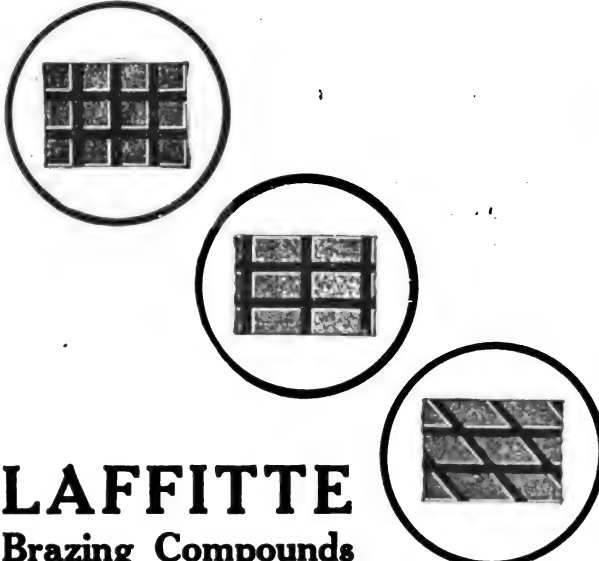
Send your wheels that need repairing to

PHINEAS JONES & CO.,

Phones 1571 } Market. **NEWARK, N. J.**
1572 }

Or to Branch Factory, 12th Ave. and 55th Street,
Phone 4926 Columbus. **NEW YORK CITY.**

Full Equipment of the Latest and Best Machinery.



LAFFITTE

Brazing Compounds

Encircle the entire field of brazing. A perfect braze and a positive saving of 83%. With Laffitte there is but one operation, all the necessary ingredients being contained in the one piece, including the proper proportion of spelter. No blistering, swelling or oxides. The Compounds flow quickly and freely, making a perfect and clean braze.

No. 1 for brazing brass, red copper and bronze
No. 2 " " " red copper and iron
No. 3 " " " iron and steel

SAMPLES FREE—on request.

The Phillips-Laffitte Co.,
Pennsylvania Building, Philadelphia, Penna.

The Stryker Muffler Cutout

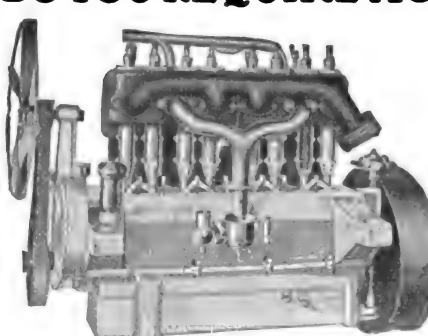
Experiments prove that the back pressure from a muffler increases with the speed of the engine—that the more you call on the engine for power, the more back pressure the engine has to overcome.

The Stryker Muffler Cutout always relieves 100 per cent of that back pressure—it gives you more power, more speed and more flexibility. It tells at once if every cylinder is working properly—it keeps the engine from heating—it saves oil and gasoline—and it is most effective when used in place of the horn.

Send for Information on Muffler Cutouts.

C. W. STRYKER - - - SYRACUSE, N. Y.

DO YOU REQUIRE MORE POWER?



THE
BRENNAN

4 cylinder 4x5, 35-40 H. P., for any standard make of car,
AUTOCAR, CHALMERS, ABBOTT-DETROIT, E. M. F., REGAL,
ELMORE, HUDSON, WARREN, ETC., or for any special make of car.
Also Transmissions. **WRITE US TODAY.**

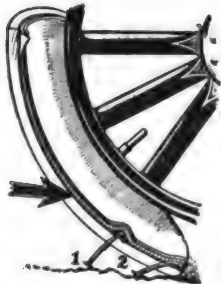
BRENNAN MOTOR CO., SYRACUSE, N. Y.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

YOUR TIRES WILL NOT Puncture or Blowout

WHEN LINED WITH "BULLET PROOF" INNER TUBE PROTECTING WEBBING

Every owner finds tire trouble not only the most expensive item in the cost of upkeep but the greatest drawback to the pleasure of motoring as well.



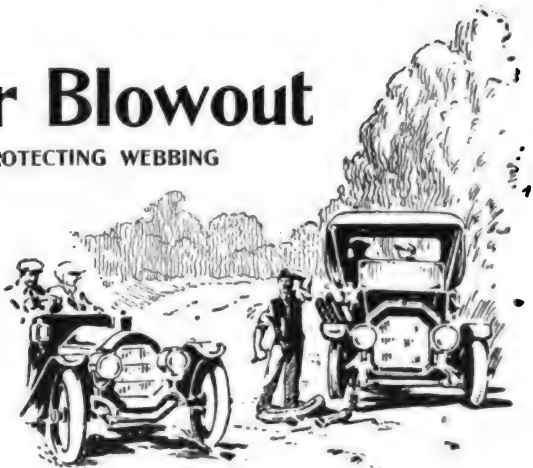
1. Shows webbing taking nail.
2. Turning nail.

With the advent of "Bullet Proof" Waban Webbing this perpetual expense was overcome—there is no longer any excuse for tire trouble and expense.

"Bullet Proof" is a heavy webbing, simply slipped between the inner tube and casing, and is the sanest and lowest priced article for lengthening the life of tires.

Easily inserted by anyone in a few minutes. If you are not using "Bullet Proof" you're the loser.

WRITE TODAY FOR BOOKLET AND PRICES



Waban Webbing Co., 207 Essex St., Boston, Mass.

Reduce Your Tire Expense

ESSEX
Double Strength
Inner Sleeve



RUBBER PYRAMID MATTING
OUTSIDE TIRE BOOTS
RUBBER LAMP CONNECTIONS
RUBBER GOOGLES

By using
The BEST Reinforcements.

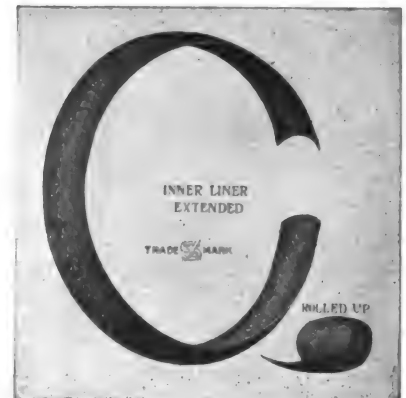
Demand ESSEX Products and secure the highest qualities at a cost no more than you pay for the ordinary kind.

Live Jobbers everywhere carry ESSEX Goods in Stock.

ESSEX RUBBER CO.
TRENTON, N. J.

WRITE FOR SOUVENIR ERASER.

ESSEX STANDARD RELINER



RUBBER SPRING BUMPERS
RUBBER GENERATOR TUBING
ASBESTOS GAS ENGINE PACKING

IF YOUR DEALER DOES NOT CARRY THIS LINE WRITE FOR CATALOGUE AND PRICES, ALSO SEND US HIS NAME.

If it's GRAY'S—It's the Best GRAY'S Newark XXX Reliners

Four to six ply, heavy tire fabric, coated with self-curing cement to prevent creeping, and perfect fitting.

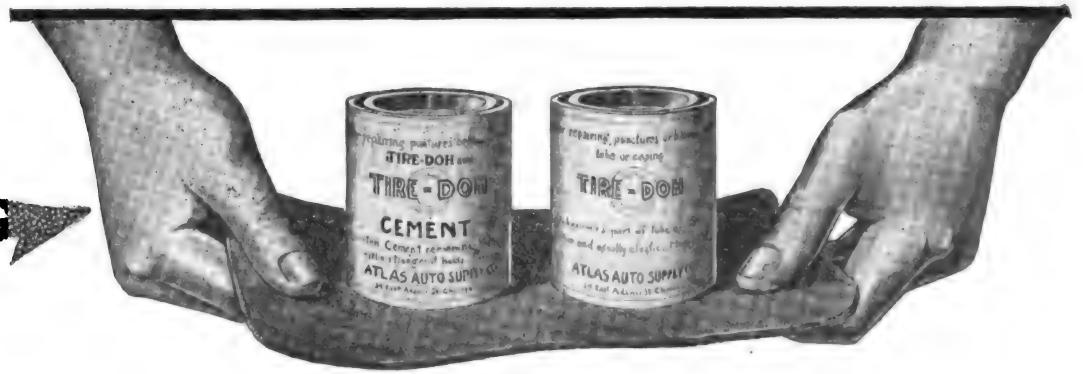
GUARANTEED NOT TO BLOW OUT!!

28x3.....	\$3.00	36x3½.....	\$4.40	36x4.....	\$5.50
30x3.....	3.20	30x4.....	4.50	32x4½.....	5.70
32x3.....	3.40	31x4.....	4.60	34x4½.....	5.90
34x3.....	3.60	32x4.....	4.80	36x4½.....	6.00
30x3½.....	3.80	33x4.....	5.00	35x5.....	7.00
32x3½.....	4.00	34x4.....	5.10	38x5.....	7.40
34x3½.....	4.20	35x4.....	5.30	37x5.....	7.50

This is a special introductory offer and goods will be sent prepaid on receipt of price.

GRAY SPECIALTY CO., - 148 Avon Avenue, Newark, N. J.

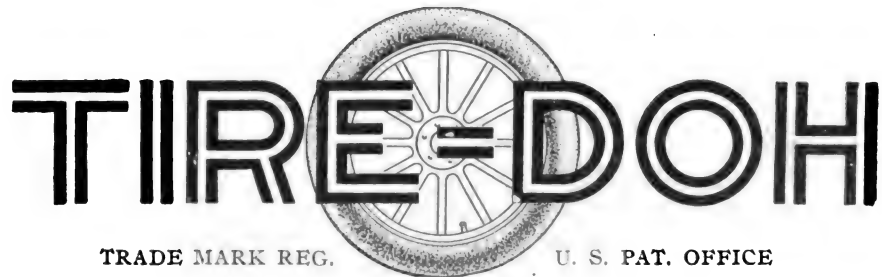
Please mention the Automobile Dealer and Repairer when writing to advertisers.



Here's all you need to permanently repair the worst puncture or blowout

Absolutely without vulcanizing and at *one-tenth* its cost you can *permanently* repair *every injury* that can happen to a *tube* or *casing*. You can do it *easier*, *quicker* and *better* than by vulcanizing—whether in the *shop* or on the *road*—with no tools but your two *hands* and an outfit of

Here's the only form you can buy it in.

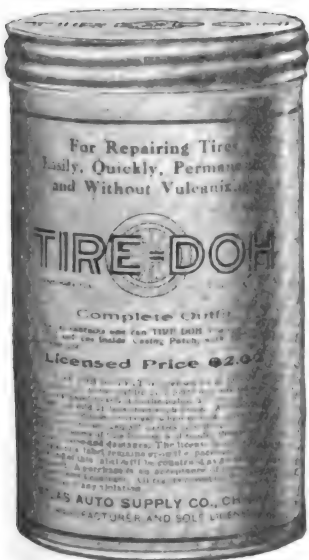


By promptly repairing cuts, sand pockets and blisters with Tire-Doh you can *double* the life of your casings and *save* nine-tenths of your tire repair expense.

This outfit comes only in a white enameled can, shown here, and consists of one can of TIRE-DOH, one can of TIRE-DOH CEMENT and one Inside Casing Patch. Neither Tire-Doh nor Tire-Doh Cement is ever sold separately or under any other label. The complete outfit is necessary to make satisfactory repairs. Price \$2.

Try it at our risk. If it does not do exactly as we say your money will be promptly refunded.

Atlas Auto Supply Co., 77 E. Adams Street, Chicago, Ill.



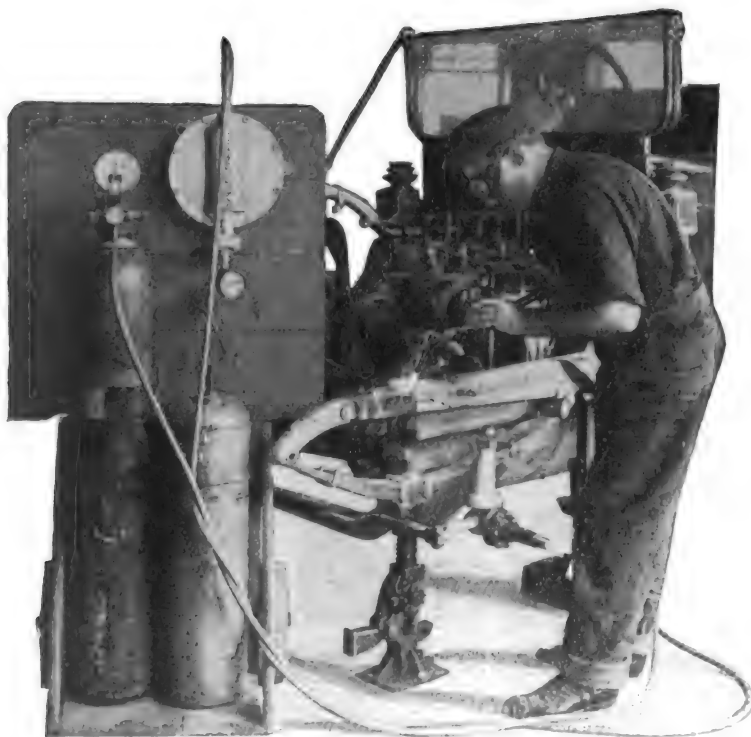
A Prest-O-Welder Outfit Will Pay For Itself in a Short Time===Try It



Millions of dollars worth of broken parts of machinery are thrown away every year. This does not by any means represent the total loss. There are costly delays both in point of time and producing capacity.

*Put Yourself in a Position to Save the Other Fellow
Money and You'll Make Money for Yourself*

Install a Prest-O-Welder. In one month we saved \$2,528.50 worth of parts at a Labor and Material cost of \$249.81.



There are splendid possibilities in this business. Write for Our Booklet telling you how to get this business and showing welding jobs we have done.

**The Prest-O-Lite
Company**

251 W. South Street

Welding Dept.

INDIANAPOLIS, IND.

NOTE

Side member of automobile frame broken close to radiator. To replace this frame would have caused a long delay, and cost over \$100. Radiator, shield and one front wheel removed to allow access for welding. No other dismantling was necessary. The side member was reinforced and made even stronger than when new for \$7.50. Process of welding frame with Prest-O-Welder taken to the job.

NOTE

CONTRACTORS

TANK MANUFACTURERS

FOUNDRIES

STEEL MILLS

STEEL, CAST IRON OR ALUMINUM FOUNDRIES

BOILER SHOPS

Please mention the Automobile Dealer and Repairer when writing to advertisers.



"EXO"

THE LOW PRICED HORN WITH
THE HIGH PRICED VOICE

Note the Price:

ALL SIZES FOR CARS OVER 30 HORSE-POWER, \$7.00

ALL SIZES FOR CARS 30 HORSE-POWER AND UNDER, \$5.00

Attach it yourself in 15 minutes. Operates from the Exhaust.
Satisfaction Guaranteed or Money Back.

Ask your dealer, or order direct.

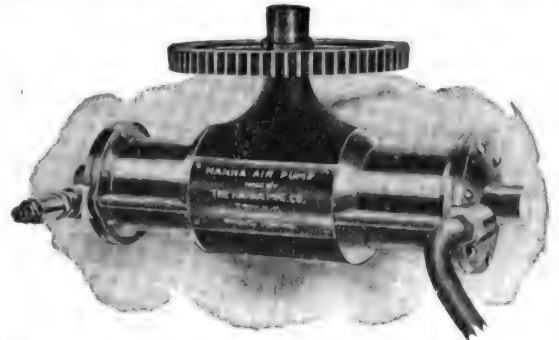
Give make, year and model of car.

TROY AUTO SPECIALTY CO., - Troy, N. Y.

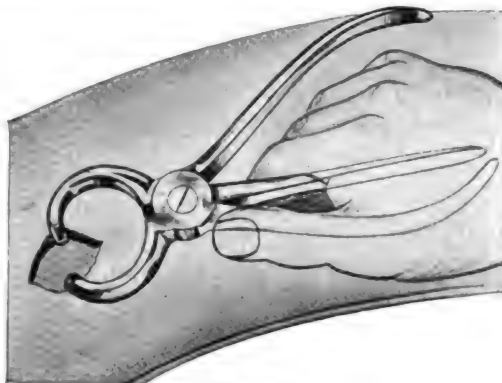
A NEW POWER AIR PUMP

Special
for
Cadillac
E. M. F.
Reo

You
Can
Attach It
Yourself.



Will inflate 34-in. x 4 1/4-in. shoes to 100 lbs. pressure in TWO MINUTES.
Price \$25.00, Complete, Ready to install, with gear bracket, rubber tubing, connections, pressure gauge, etc., etc.
Guaranteed or Money Back. Try It and Be Satisfied.



Patented.

A booklet, "Cutting Out Tire Expense."

One printed for YOU. It's free—No postage.

Were GILMER TIRE REPAIR PLIERS included in the equipment of your car when you bought it? If not, ask your dealer for them, or send me his name and \$1.00, and get a pair by return mail. My guarantee is—**Satisfaction or money refunded.**

OWNERS—Repair the Cuts.

VULCANIZERS—Don't vulcanize a hole full of dirt, get GILMER TIRE REPAIR PLIERS and do a good job.

DEALERS—Each of your customers will sell himself a pair when he sees them.

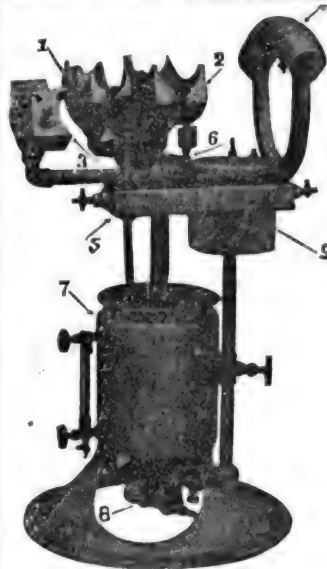
G. WALKER GILMER, JR.,

MANUFACTURER,

52 No. 7th Street, Philadelphia, Pa.

P. S.—Sample of self vulcanizing gum and cement sent for 25 cents additional.

The "Master" M.A.C. STEAM VULCANIZER 4 TIRES at ONE TIME



We have tire repair plants that fill the requirements and fit the pocket of Every Buyer.

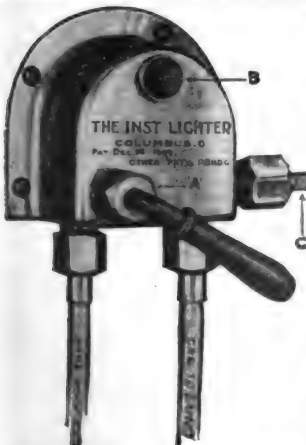
For the garage, the Master at \$100.00.

For the exclusive tire repair shop, the models run from \$100.00 to \$500.00.

We have them as low as \$25.00.

Write for catalog.

HAYWOOD TIRE & EQUIPMENT CO. 528 N. CAPITOL INDIANAPOLIS IND.



THE INST LIGHTER

lights and controls the gas head-lights from the driver's seat.

Can be mounted on the dash or on the heel-board.

THE ONLY SUCCESSFUL LIGHTER ON THE MARKET.

The spark is under absolute control of the operator.

NEW MODEL, with new indestructible burner clips, improved coil, tubing, wire, etc., \$15.00.

THE INST LIGHTER CO.,

55 E. Main St., COLUMBUS, O.

"TITE-WAD"

CANT TEAR IT OFF

The Rubber Putty.

Repairs Tires—both casings and Inner tubes or anything made of rubber WITH-OUT VULCANIZING, and at one-tenth the cost.

Biggest Seller for Dealers. Because the greatest time and money saver for owners. NO TOOLS BUT THE HANDS required and repairs can not be made better by any method or apparatus.

We Guarantee the User Satisfaction or Money Back.

REPAIR SHOPS

Many of them now use "TITE-WAD" exclusively in repairs. Cost one-tenth of vulcanizing, takes less time, results are better more profit.

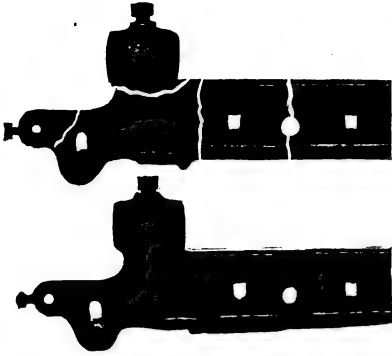


Page-Lester Co., Omaha Bldg. Chicago, Ill.

Automobile Repairs

ELECTRIC and OXY-ACETYLENE WELDING OF ALL BROKEN PARTS

ALUMINUM CASES AND CRACKED CYLINDERS WELDED

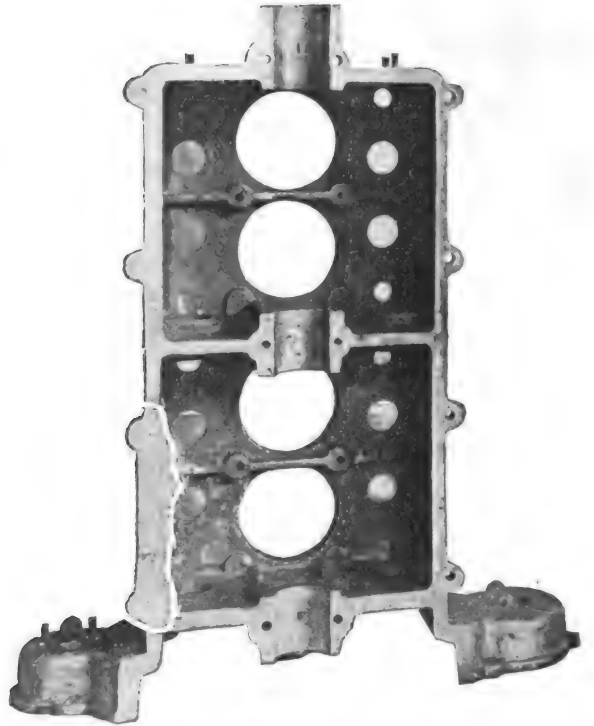


CAST IRON.

Transmission Cases, Intake and Exhaust Pipes, Broken Chassis re-enforced and welded.

We also design and build special machinery and do a General Repair business.

All Work Absolutely Guaranteed.



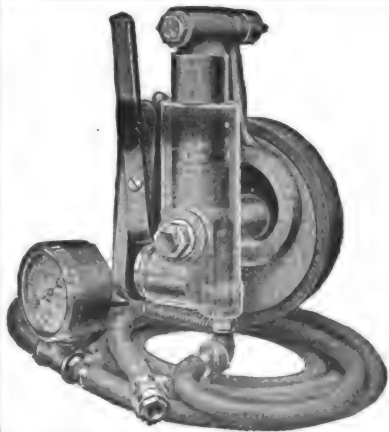
ALUMINUM CORE.

SEND FOR OUR LITTLE BOOKLET.

THE HUB MACHINE, WELDING & CONTRACTING CO.,

621-23 Cherry Street,

Philadelphia, Pa.



TEN EYCK AUTOMATIC TIRE PUMP

Starts and stops by merely attaching the hose to the tire.

Write for Catalog

Auburn Auto Pump Co.
537 Tremont St.,
BOSTON, MASS.

AUTOMOBILE

Bodies, Chassis, Wheels, Steering Devices, front and rear Axles, Steel Rims, etc.



GET OUR PRICES AT ONCE.

BORBEIN AUTO CO.



2109-2111 N. 9th Street,
ST. LOUIS, MO.

Special Request

IN writing to advertisers for circulars or information, you are earnestly requested to mention in each case that the advertisement was seen in the "Automobile Dealer and Repairer." By so doing you will confer a favor on both publisher and advertiser

Please mention the Automobile Dealer and Repairer when writing to advertisers.

One Year's Success

A year ago Connecticut Shock Absorbers were comparatively unknown.

Today they are furnished as regular equipment on nine leading makes of cars. The number of individual purchasers is also increasing every month.



Shock Absorbers

The following list of manufacturers includes only those who furnish Connecticut Shock Absorbers as regular equipment :

Abbott-Detroit Motor Co.	Kissel Motor Car Co.
American Motor Car Co.	Schacht Motor Car Co. of Canada
Colby Motor Car Co.	Knox Automobile Co.
Fiat (Italy)	Russell Motor Car Co.
Matheson Motor Car Co.	(Canadian Silent Knight)

Special recognition is due these manufacturers who, regardless of any other consideration, adopted Connecticut Shock Absorbers solely upon their superior merit.

This coming season will find us in the field stronger than ever—with a product better than ever—and deliveries quicker than ever.

We install the Connecticut Shock Absorber on the car without charge. Write for details and for particulars of our Free Trial Offer.

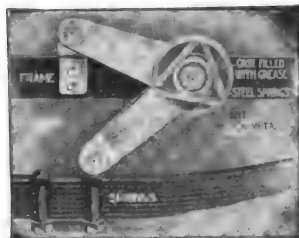
Catalogue No. 18 contains interesting facts about Connecticut Shock Absorbers. Sent on request.

Model Standard, \$50.00 Model Light, \$30.00

**Connecticut
Shock Absorber Co., Inc.**
MERIDEN, CONN.

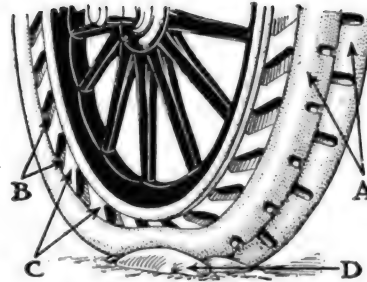
Branches

231 West 54th St., New York
1146 Michigan Ave., Chicago
1414-16 Race St., Philadelphia
544 Van Ness Ave.,
San Francisco
1528-30 Broadway, Denver
819A Boylston St., Boston



SECTIONAL VIEW.

Easy Riding, Trouble-Proof Tires



A—Shows double, notched treads.
B—Shows undercut sides.
C—Shows slantwise bridges.
D—Shows absorbing means when passing over an obstruction.

Motz Cushion Tires have double-treads, which prevent skidding and distribute the weight to the sides. The undercut sides allow free action of the bridges. The slantwise, elastic bridges give and yield like the air in a pneumatic tire.

These tires are wholly unaffected by punctures or blow-outs. Never need repairs. They end the necessity of carrying extra tires.

And every set of Motz Cushion Tires is guaranteed for 10,000 miles—two years.

Motz Cushion Tires

fit any standard clincher, universal quick-detachable or demountable rim.

Dealers and Garage Men, here is an opportunity to make big money. For the Motz Cushion Tire is a fast seller. Built for electric, gas and utility cars of all kinds.

Postal brings catalog 95 and agency proposition.

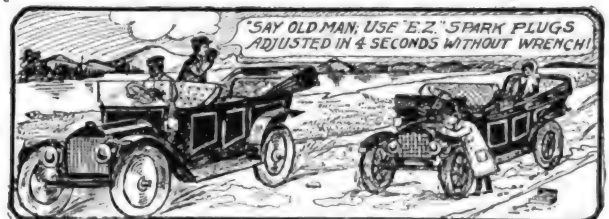
THE MOTZ TIRE & RUBBER COMPANY

Factories and Executive Offices: AKRON, OHIO.

BRANCHES:

1737 Broadway, New York
999 Woodward Ave., Detroit

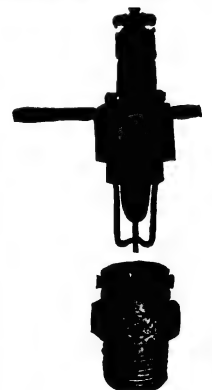
2023 Michigan Ave., Chicago
409 E. 15th St., Kansas City



Simply Insist On Having The "E.Z." QUICK DETACHABLE SPARK PLUG

For Automobiles, Motor Trucks, Motor Cycles and Motor Boats.

THERE is no substitute for the E.Z. No other spark plug made or sold possesses its superior and distinctive features or real merit, no matter what the dealer may tell you about "Something just as good." Every "live" dealer everywhere, sells the "E.Z." Consider these points: Adjusted in 4 seconds without a wrench; no metal to metal joints; any part can be purchased separately.



PRICES:

Complete Plug,	\$1.25
Interchangeable Core,	.75
Core Socket,	.50

THE AUTOPARTS MFG. CO.
C-810 West Side Ave., JERSEY CITY, N. J.

AUTO CASINGS AND TUBES—Fresh Stock

Maple Grove Farm,
Underwood, Minn., July 7, 1911.
Wm. Vanderpool, Springfield, Ohio:
Dear Sir—I find your rubber goods just as good as those I have been paying twice the price for.
(Signed) OSCAR SWANSON.

Thornton, Texas, March 13, 1911.
Wm. Vanderpool:
Dear Sir—Please quote prices on your tires. Dr. Bass of Barry, Texas, recommends them very highly. I want to try them. My wheels are 28x3 1/2.
Yours, etc.,
(Signed) W. A. BEDFORD, M.D.

Versailles, Ky., Mar. 15, 1911.
Mr. Wm. Vanderpool:
Dear Sir—You see I am back again this season looking for good casings. Kindly send me your prices on 32x3 1/2 casings and any others you are selling.
(Signed) DR. S. A. BLACKBURN.

	CASINGS		TUBES		Reliners	By Mail add
	Guaranteed	2nd Quality	Guaranteed	By Mail add		
28x3	\$9.85	\$8.50	\$2.75	\$0.27	\$2.75	\$0.33
30x3	10.50	9.25	2.85	.28	2.85	.34
30x3 1/2	14.95	12.75	3.75	.48	3.40	.37
32x3 1/2	16.75	13.25	4.25	.48	3.50	.39
34x4	22.25	19.50	5.75	.....	4.80	.53

Guaranteed Motor Cycle Cases and Tubes. Single clincher only, Bailey Type tread.

28x2 1/4 case, \$7.75; tube, \$2.50; by mail, \$2.65.
28x2 1/4 case, \$8.30; tube, \$2.65; by mail, \$2.82.

Send for price list on all size Cases, Tubes and Reliners. On receipt of 10¢ I ship, allow examination. Many have re-ordered. If you order a Tube or Reliner and want it sent to you by mail, send Post Office Order for total amount. On account of my growing trade in the South send your order, if located in the South, to Jacksonville, Florida.

WM. VANDERPOOL

Main Office

SPRINGFIELD, OHIO

Branch, JACKSONVILLE, FLA.

Buckeye City, O., March 24, 1911.
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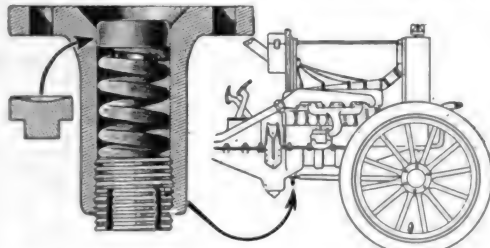
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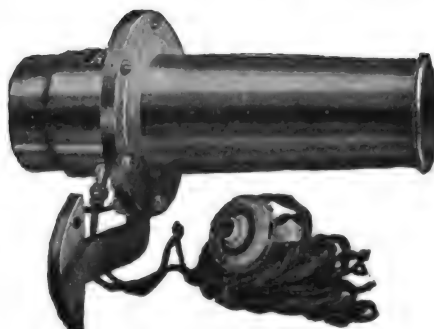
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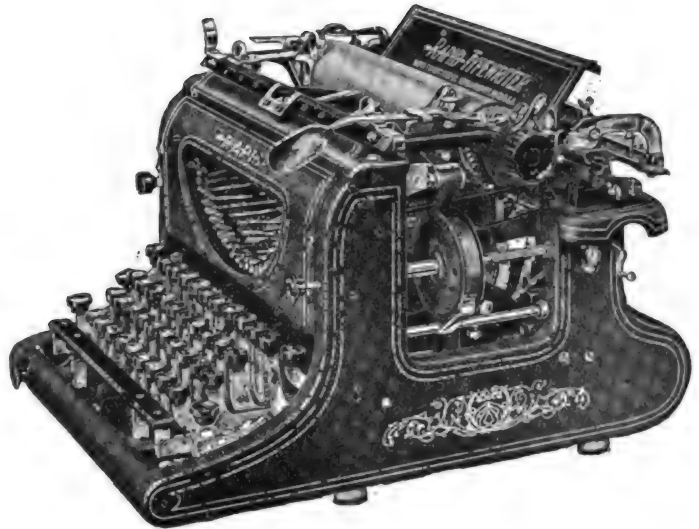
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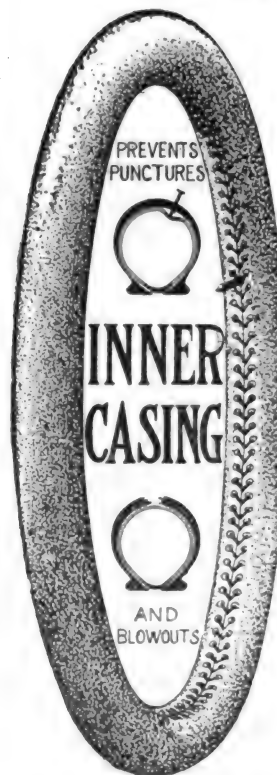
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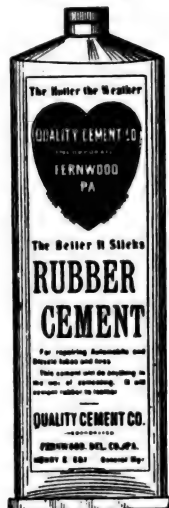
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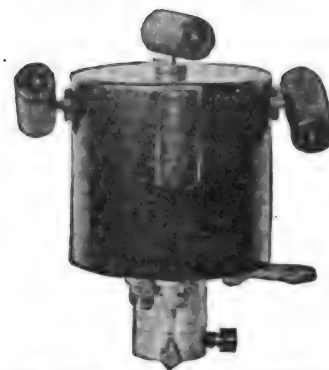
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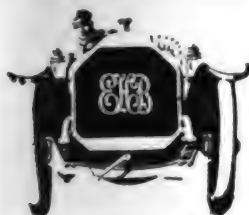
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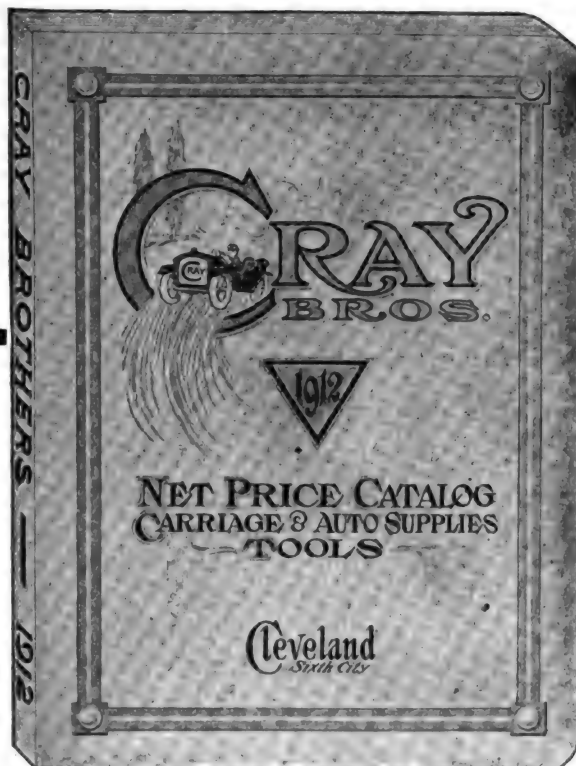
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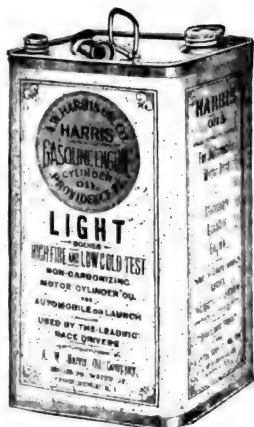
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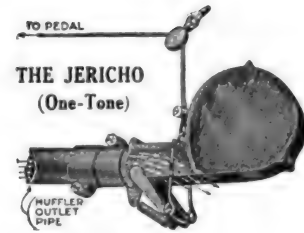
If we can satisfy a Taxicab Company, whose cars go through such hard service, we can satisfy every Auto Owner who will give us the chance.

Write, 'phone or wire your order to factory. Ask for our Booklet "Tire Sense."

20th Century Tire Protector Co.,
Main Office and Factory, Dallas Office
Midlothian, Texas. 411-12 Slaughter Bldg.

Jericho ONE TONE Horn Jubilee CHIME TONE Horn

The Signal of a Gentleman—Warns Without Offence



Assurance against accidents is infinitely better than accident insurance. The ordinary bulb horn is **not enough**—either on winding country roads or on noisy city streets. The Jericho, on the other hand, is **just enough**—the perfect motor car signal—always on the job and doing its work with 100% efficiency.

Both Jericho and Jubilee have three points of supremacy:

1. Efficiency
2. Simplicity
3. Economy

A loud, clear signal whose mellow tone "warns without offence." The **only** exhaust horn that **cannot** clog.

Easily attached to any car and operated by foot pedal, leaving both hands free to run the car.

Low purchase price—is operated by the exhaust—no batteries, etc., needed, and absolutely no maintenance cost.

Equip your car with a Jericho or Jubilee and motor without anxiety.

Jericho costs \$7—\$8—\$9, according to size.

Jubilee costs \$8—\$9—\$10, according to size.

Sold by all dealers or direct from us. THE JUBILEE (Chime-Tone)



Send for our free booklet D, about Jericho and other auto accessories.

THE RANDALL-FAICHNEY CO., Boston, Mass.

HOW TO RUN AND INSTALL GASOLINE ENGINES



THIS little book was written especially for beginners. Either the man who uses an engine for pleasure or profit, but who has not time to study a technical book.

It gives full details in connection with running gasoline engines, stated in simple language that anybody can comprehend. It contains numerous illustrations.

A copy will be sent you on receipt of the price, 25 cents, in postage stamps.

Motor Vehicle Publishing Co.,

71-73 Murray Street,
NEW YORK CITY.

Car Economy

DEMANDS THE FREQUENT USE OF

Golden Star

AUTO BODY POLISH

THE WORLD'S BEST

Cleaner and Polisher



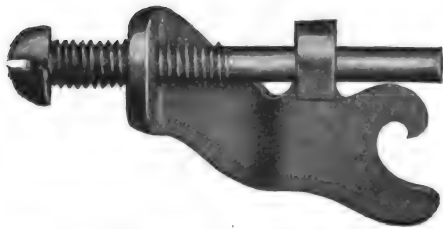
It will keep the finish clean, bright and clear, giving it the smooth, velvety freshness that all desire.

Prove the merits of this polish at our expense.

Get a free sample of your dealer or write us.

The best dealers and jobbers sell Golden Star—ask them.

R. W. MORRIS MFG. CO.
(Incorporated)
KANSAS CITY, MO., U. S. A.

Q. D. RIM REMOVER**Saves Time, Labor, Trouble**

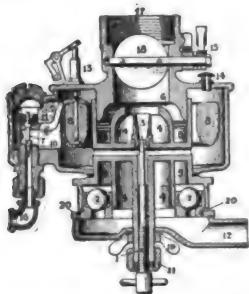
Hook the tool over the outer edge of tire rim, between the two ends of locking ring. Push valve stem into rim so that locking lug clears inside of Shoe. Screw the head ring off locking ring. It holds the rings apart, leaving both hands free to remove the locking ring. Nickelled and case hardened, it weighs 2½ oz. If not carried by your dealer, mailed prepaid in the U. S. on receipt of 65c P. O. or EXPRESS MONEY ORDER, or 75c on personal check, by

WM. L. TOBEY12 Lewis Street,
EAST BOSTON, MASS.**Packard**
CABLE**IS THE PUBLIC'S CHOICE FOR
Lasting Ignition and Lighting Service**

Why? "Ask any user."

Want new 2-color circular?**THE PACKARD ELECTRIC COMPANY**

229 Dana Avenue, Warren, Ohio.

**PLANHARD
CARBURETORS**

are not only different but give greater motor efficiency than any other on the market. The Planhard is the only auxiliary air ball control in the world.

Write for trial sample.

Live agents wanted.

THE PLANHARD MFG. CO.

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Boston, Mass., L. P. RHINES, Room 406, Old South Bldg.

**"STAR" LATHES**

9 in., 11 in., 13 in. SWING.

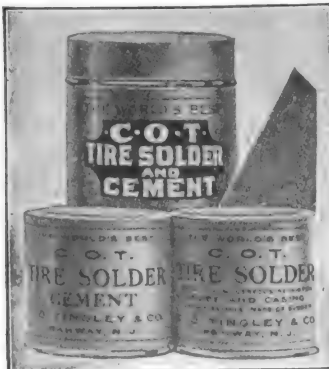
Suitable for fine accurate work in the garage, repair shop, tool-room and machine shop.

Send for Catalog B.

THE SENECA FALLS MFG CO.

A-1

429 Water Street, SENECA FALLS, N. Y.



GUARANTEED to do the work of repairing digouts and cuts in shoes and repairing punctures in tubes or anything made of rubber.

Ask your jobber.
PRICE, \$1.50.

C. O. TINGLEY & CO.
Rahway, N. J.**STOP THAT TIRE EXPENSE**

Equip your car with "UNIVERSAL" tire protectors. "The treads which I placed on my car two years ago are still on, and my tires have not cost me one cent for repairs. They are apparently good for another 8,000 miles," says Dr. Leisenring of Wayne, Neb.

We pay transportation charges both ways and refund your money if goods are not as represented.

Good territory still open for live agents.

Write us today. Don't delay.

UNIVERSAL TIRE PROTECTOR CO.

Lock Box 678 D

Angola, Indiana, U. S. A.

THE 2-3-2 or 3 A-C-C ENGINES
(2 Cycle Three-Cylinder 2 or 3 Port Air-Copper Cooling Engines)

Air Cooled 20-22 H.P.

Also Made in One and Two Cylinders.

Construction is simple, durable, absolutely reliable, and smooth running.

All work thoroughly tested, and perfect satisfaction guaranteed.

Write for catalogue and information

E. H. ZACHARIAS, - - 121 Washington St., Reading, Pa.**WELDING AUTOMOBILE PARTS**

Cracked or Broken

Cylinders, Crank Shafts, Crank Cases, Housings, Frames, Axles, any metals of any shapes or thicknesses, including

ALUMINUM PARTS

All work absolutely
GUARANTEED

Manufacturers of welded (seamless) gasoline and oil tanks.
Write for estimates.

Complete Oxy-acetylene Welding and Cutting Plants Installed.
Western Welding & Mfg. Co., 557 & 559 W. Jackson Boulevard, Chicago, Ill.

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Reliance

(REG. U.S. PAT. OFF.)

SPARK PLUGS

Sparks
in
Water

Take less battery power than any other plug.
Are absolutely proof against soot in any form.
Dirty motors won't affect them. Patented electrical action destroys soot as fast as deposited.

Carbon does not affect them. No cylinder knock means longer life to your motor.

Gives HOT concentrated spark.
More power—greater fuel economy.

Reliance porcelain stands fifty to ONE HUNDRED per cent. greater voltage than any other.

Reliance plugs are positively and unconditionally guaranteed to satisfy.

Try Reliance plugs. Regular type, \$1.00; Magneto type, \$1.25. Sent prepaid on receipt of price if dealer can't supply.

Write for our great book, "Ignition and Spark Plug Talk"—tells all ignition secrets; makes you master of your ignition system.

Pocket size—convenient to carry. Sent free.

JEFFERY-DEWITT CO.,

60 Butler Ave. DETROIT, MICH.

New York Branch—1789 Broadway.



Magneto Type
\$1.25

Regular Type
\$1.00



UNIVERSAL TERMINAL

The Mac-Kae Universal Terminal fits *any* type of plug, either foreign or domestic.

Turn the threaded fibre sleeve and the jaws are firmly closed and *simply cannot work loose.*

If the top nut on the plug is lost, the elliptic opening in the brass jaws of the Mac-Kae Universal Terminal will give a secure hold on the thread of the plug electrode.

By fully extending the jaws, this terminal will give secure contact on a plug through the top cap, if by accident the threaded post should be broken off.

You can remove the Mac-Kae Universal Terminal while the motor is running.

A little thing that adds much to the pleasure of motoring.

25c each at all dealers, or direct from us.



MAC-KAE MFG CO.

Boston, Mass.

Mac-Kae Spark Plugs are best. \$1 each.



ADAMANTINE
AMERICAN TAP & DIE CO.
GREENFIELD, MASS, U.S.A.

"Adamantine"

Screw Plates

— Send for Catalogue —

**American
Tap & Die Company**
Greenfield, Mass.



SPECIAL OFFER.

If you will send us your dealer's name and address, we will send you two sets Auto patches for \$1.00, postpaid.
You will always need patches and we want to prove to you our patches do all we claim.

A FEW REAL FACTS:

SECURITY

Self Vulcanizing Patches

Are in a class by themselves.
Because, they not only stick, but they Self Vulcanize.
They make a permanent repair.
The more heat from running, the tighter they hold.
They require only gasoline to apply.

JOBBERS—Security Patch sales will show you the right profit on the right side.

Auto Sets, 10 Assorted Sizes, - - \$1.00
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Write for circular and price List of Security Self Vulcanizing treads. Sold complete, ready to apply.

THE SECURITY CO., 20 Shinglass St., Pittsburgh, Pa.

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Diamond REPAIR DEVICES.

Dealers who sold DIAMOND REPAIR DEVICES last year made good money.

They found a market already prepared—sales were easy—demand growing all the time.

For Diamond Cementless Patches, Diamond Tire Sleeves and Diamond Repair Material are saving money for motorists by enabling them to get more mileage.

Take advantage of this yourself, Mr. Dealer. Write Mr. Harris' desk today and you will get prices and interesting facts by return mail.

**THE DIAMOND RUBBER CO.,
AKRON, OHIO.**

**Fifty-four Diamond Service Stations do more than sell tires—
They take care of Diamond tire users.**

ATLAS CHAINS.

The recent decision of Judge Lacombe in the New York Circuit with reference to chains manufactured by this Company should not in any sense be accepted by the trade as final.

Favorable decisions with reference to snug fitting chains have been rendered in other Circuits, the most recent of which is the opinion of Judge Angell of Detroit, under date of Dec. 18, 1911, who held that a snug fitting chain was NOT an infringement.

Being assured by eminent counsel that ATLAS CHAINS do not in any way infringe upon Parson's Patent as defined by the Court of Appeals in Chicago, July 27, 1911, we have already taken steps to carry our case to the Court of Appeals in this Circuit, where the matter will receive prompt and full consideration.

Pending the decision of the Court of Appeals, ATLAS CHAINS will only be manufactured and sold as a non-creeping chain, and we solicit orders therefor.



ATLAS CHAIN COMPANY
Bush Terminal **BROOKLYN, N. Y.**

Peerless Four-Cylinder Tire Pump

A Powerful, Compact Air Compressor for Quick Inflating with Little Work.

Having 4 cylinders instead of one and turned by a rotary motion, it far surpasses the straight stroke pump for comfort and speed. It clamps on the running board solidly and permits of turning in either direction.

Handle is removable and fits with Pump and Clamp in the tool box. Crank handle can be used as a clamp fastener also. Guaranteed High Pressure Gauge reading to 150 lbs. Plenty of hose to reach tires. Pump is built like a high-grade four cylinder engine, by expert builders of compressed air machinery, and is guaranteed for five years.

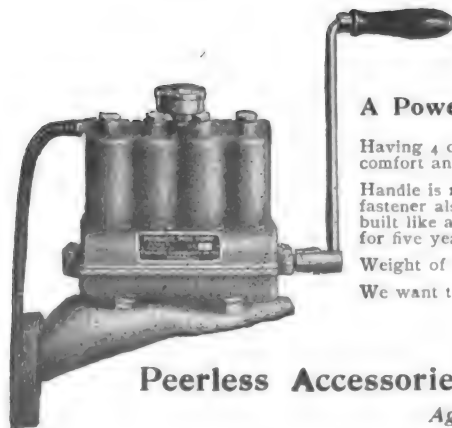
Weight of Pump including all attachments, is nine lbs. Fits on the palm of the hand.

We want to show you how you can pump with a Peerless and perspire less; you'll be interested.

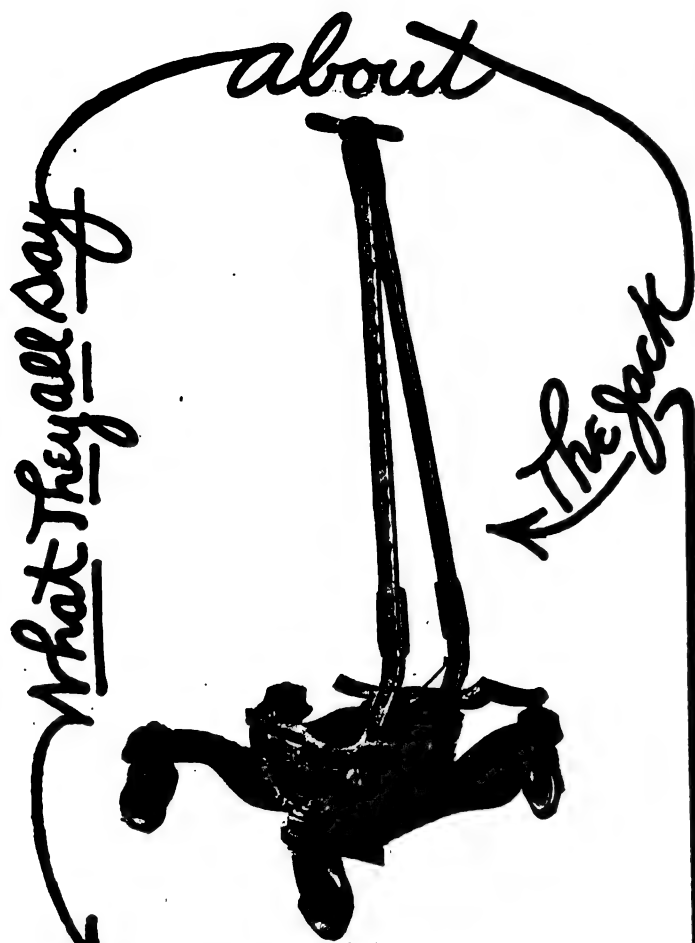
WRITE FOR FOLDER AND BOOKLET

Peerless Accessories Manufacturers, 1926 Wabash Ave., Chicago, Ill.

Agency Proposition to Live Dealers in Every Locality.



Please mention the Automobile Dealer and Repairer when writing to advertisers.



"UNIVERSAL" Combination Auto Jack and Emergency Truck

MERCEDES REPAIR COMPANY,
159 East 54th Street,
New York.

January 15th, 1912.

The Canton Foundry & Machine Co.,
Department "C,"
Canton, Ohio.

Gentlemen:

Replying to your letter of January 11th, we beg
to say your Auto-Jack and Emergency Truck has
been in constant use in our shops, and has given
entire satisfaction.

We have not as yet had occasion to use it where
an axle has been broken, but judging from our
experience, we know it will prove a great value in
such a case.

Yours very truly,
(Signed) **MERCEDES REPAIR CO.**
Per W. L. Kavanagh.

Do not fail to ask us for a copy of Booklet "C-1,"
describing "UNIVERSAL" Auto Turntables and
"UNIVERSAL" Auto Jack and Emergency Truck.
YOU NEED THEM BOTH.

THE CANTON FOUNDRY & MACHINE CO.
CANTON, OHIO



Makes Tires Last Longer

Every tire manufacturer,
every tire dealer says—

"Know Your Tire Pressure"

You can only get full mileage by
keeping tires properly inflated. You
can't guess—how will you find out?
An accurate, simple tire gauge is what
you need. The best is—

**ALLEN
TYROMETER**
TIRE PRESSURE GAUGE

PRICE \$1.00

Will you invest one dollar to find out your proper tire
pressure? Of course—because it will save you many, many
dollars in additional mileage and fewer punctures.
Get your ALLEN TYROMETER to-day. At all dealers
or from us. Has clip-cap, can be carried in vest pocket
like a fountain pen. Handsomely nickeled. $4\frac{1}{2}$ inches
long. Always ready—always works. Large, readable figures.
Sliding band held until you reset it. Pressure instantly shown.

ALLEN TIRE CASE

Allen Tire Cases are the acknowledged standard. There
is no question as to their superiority. They are made of
the finest possible material—the BEST ENAMEL DUCK.
They are built to withstand the most severe usage. They
come in all colors and color combinations. They are abso-
lutely necessary and "they button on."



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1928 Broadway, New York
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LIGHT YOUR HEADLIGHTS BY ELECTRICITY

The Successor to the Gas Tank
Current Direct from Magneto

FOR FORD CARS, \$15.00

WITH FLY-WHEEL MAGNETO

For any other Car \$50.00

This outfit is the same as our \$15.00 Ford Lighting Outfit with the addition of a \$35.00 K-W Low Tension Magneto, which can be remounted on almost any car to run the lights.

THE SIMPLEST ELECTRIC LIGHT OUTFIT IN THE WORLD

NO Storage Battery to Sulphate or Short Circuit.
NO Commutator or Brushes to make trouble.
NO Complicated Cut Out to go wrong.
NO Delicate Ammeter or Voltmeter.
NO Complicated Electrical Connections.
And the PRICE is right.

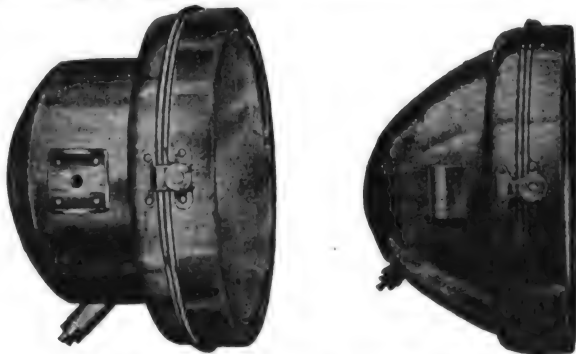
Not makeshifts, but are complete in every detail, designed and engineered to work in connection with ignition, both deriving their supply of current from the Ford Magneto.

The Outfit complete, which is all you need, consists of

- 1 pair complete Head Lamps with Parabolic Reflectors with 1 1/4" Focus.
- 2 Tungsten bulbs, 2 1/16" in diameter.
- 12 feet wire, cut proper length and soldered to connectors.
- 1 Diamond Switch.

Instruction Sheet for Wiring.

The best results in electric lighting cannot be obtained by the use of reflectors in gas lamps. The highly burnished silvered surface must be protected in a dustproof lamp.



Choice of either Straight Body or Bullet Shaped Lamps.

The Lamps are made entirely of one piece of brass drawn from steel dies; have no soldered joints, easy to polish, and are 9" over all, making a handsome lamp for the Ford cars. They fit the forks furnished on the Ford cars.

The Light which this outfit gives is vastly superior to either a generator or a gas tank.

The Bulbs have a Tungsten filament of the proper voltage and amperage, which will not interfere with the ignition, and have the Edi Swan or Bayonet base, impossible to fall out and injure the silver reflector like the screw base.

SPECIAL TEN INCH BULLET SHAPED LAMPS Outfit de Luxe, \$17.00

For those who want something "extra swell" or "classy" for the touring car, we can furnish, if desired, a 10" bullet shaped lamp which also fits the prop furnished on Ford cars.

The 9" lamp is, however, as large as is required to catch all of the rays and throw all of them forward, and a larger lamp than this is merely for looks.

For Black Finishing add \$1.00 to price of either outfit.

Write for CATALOGUE
and
Complete Information.

2817 CHESTER AVE.
THE K-W IGNITION CO.
CLEVELAND, OHIO, U.S.A.



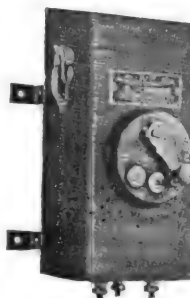
Master Vibrator

For all Cars using Vibrating Spark Coils.

Designed and built especially for

Ford Cars will give you

MORE SPEED, MORE POWER, MORE FLEXIBILITY
and does away with separate vibrator adjustments.



You will never know how much speed, power, and flexibility there is in your car until you try a K-W Master Vibrator. It takes the place of the separate vibrators on your coil, giving one fast vibrator and powerful condenser for all of them, thus giving absolute synchronism, with a smoother running engine. It simply makes the hills 'fade away.'

Try it 30 days, and if for any reason you don't want it, return it and get your money back.

THE K-W HIGH TENSION MAGNETO

Model J
Guaranteed
to Start Auto
Engines up
to 30 H. P.



No Coil
No Timer
No
Batteries
4 Cyl., \$50
6 Cyl., \$55

Extremely simple—nearly half less parts than any other Magneto. Perfectly reliable.

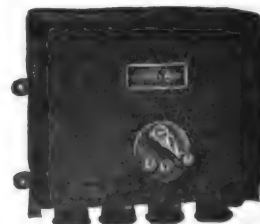
We make larger Magnetos for larger engines.

If you cannot gear-drive a High Tension Magneto, use one of our \$35.00 Low Tension belt or friction drive Magnetos and a K-W Spark Coil.

K-W Low Tension Magnetos run the lights at night and can be switched off in the daytime or used for ignition with coil and timer. High Tension Magnetos are for Ignition only.



Low Tension.....\$35.00
Belt or Friction Drive.
Used with K-W Coils.
NO Moving Wires.
NO Brushes. No Commutator.
Runs in Ball Bearings.
Starts engine without batteries.



The K-W Spark Coil.
4-Cylinder.....\$30.00
2-Cylinder.....18.00

Has its winding
GUARANTEED FOREVER
against breakdown.

WE PAY THE EXPRESS East of the Mississippi River or to the Mississippi on points beyond, on any of our goods, when cash accompanies the order.



Never Another Day—Hour—or Moment of Tire Trouble!

DON'T endure it! You don't need to! Save your temper—and your money. You can enjoy your motoring wholly free from any form of tire trouble—never an interruption or delay; never a tire accident; never a tire repair—just equip your car with

Standard Tire Protectors

Made of rubber and fabric—the only practical materials for tire protection, a new rubber, the toughest ever produced, and hardest woven Sea Island Cotton Fabric—almost like armor plate around your tires. These Protectors are easily, and quickly applied—just slipped on over the deflated tires and held fast simply by inflation pressure. No mechanical attachments. Sand or gravel cannot get between the Protectors and the tire. You get skidding protection in addition to tire protection—with our famous non-skid tread, saving you the cost of having your tires retreaded and avoiding the injury to your tires that retreading nearly always does. The application of heat in the retreading process weakens the tire and shortens its life. **Standard Tire Protectors** save your tires and give you the double protection at one economical cost.

And the cost of **Standard Tire Protectors** is now an average of 20% less than last year on all sizes. Our new manufacturing facilities have made this possible—an improved Protector at a lower price. **Standard Tire Protectors** are not a new "fad." Thousands of motorists have proved them indispensable to motoring economy and pleasure. They will save you 90% of your motor car up-keep costs. Put them on your car now—save your tires, save your money, save your time, and save yourself from all the misery of tire troubles.

A Free Book on Tire Protection

will be sent to you on request. It proves the five-dollar-for-one, and often higher, value to you of **Standard Tire Protectors**. Write for this free book to day.

Dealers: More business and bigger discounts on **Standard Tire Protectors**. The old "bugaboo" of "Price too High," killed. Write us at once for particulars of our 1912 Sales Co-operation to dealers and new price list.

THE STANDARD TIRE PROTECTOR CO.,

350 E. Market Street,
AKRON, OHIO



Cross Section



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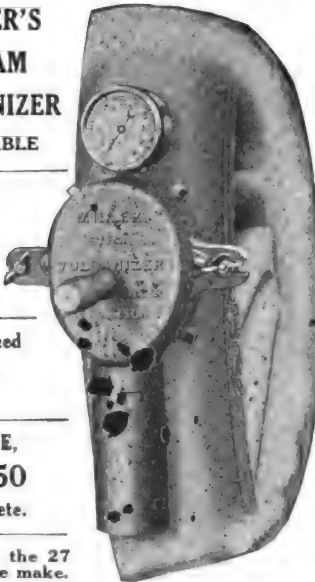
MILLER'S STEAM VULCANIZER PORTABLE

Repairs
Casings
and
Tubes.

Guaranteed
Nothing
Better.

PRICE,
\$7.50
Complete.

One of the 27
kinds we make.



MILLER'S REPAIR MATERIALS

Standard Tread Stock,
per lb.....\$.70
High Grade Tread Stock,
per lb......85
Cement Stock for Casings 1.25
Cement Stock for Tubes... 1.75
Inside Tube Patching Rub-
ber, cured one side, per lb. 2.00
No Cement Patches, per
dozen packages..... 2.50
No Cement Patching Rub-
ber, sheet form, per lb... 2.00
Fabric Sea Island Cotton,
17½ ounces, one or two
sides..... 1.10
Fabric Common Tire
Cloth, 18 ounces, one or
two sides......65
Fabric Common Bicycle
Tire Cloth, 10 ounces,
one or two sides......65
Pure Fine Para Gum, for
making acid Cure or Cold
Patching Cement.....Net, 2.00
Miller's Three in One Re-
pair Stock..... 1.20

This stock repairs casings and
tubes and makes cement, and
eliminates the necessity of carry-
ing a large variety of repair
material.

The above prices subject to
5 per cent. discount for cash
with order, or in 100 pound
lots or over, 10 and 5 per cent.

Write for our 36-page Catalogue,
which illustrates large kettle
vulcanizers; adjustable sec-
tional vulcanizers; inner tube
vulcanizers; inside vulcanizers;
retreading vulcanizers; adjust-
able segment iron cores, tread
rollers, power wrapping ma-
chines, steam boilers, grinding
stands, circular wire brushes,
grinding wheels, full line of
small rubber tools, tire lasts,
automatic steam traps, steam
regulators, air bags, gas tub-
ing, auto bumpers, baby car-
riage tires, inside and outside
blow-out boots, no cement
patches, repair stocks, hand-
made bicycle tires, motor cycle cas-
ings and red tubes of extra quality.

MILLER'S IMPROVED ADJUSTABLE, SECTIONAL VULCANIZER

The kind that repairs everything in the Tire line—all sizes of bicycle, motor cycle, auto and
aeroplane tires, also 4 to 6 inner tubes at one time. Made and designed by the man who
originated and patented the Cavity Vulcanizer, so generally used throughout the world.

One of the
27 Kinds
We Manufacture.



Prices Complete with
Bead and Tread
Molds, \$95.00

Price Complete with-
out Bead and Tread
Molds, \$42.00

MILLER'S TIRE RELINERS—4 PLY ADHESIVE—EXTRA QUALITY

Net Prices—Cash with Order 5 per cent. off.

Each	Each
26x3½ inches.....\$1.95	31x4 inches.....\$3.20
26x3 ".....2.30	32x4 ".....3.40
30x3 ".....2.55	33x4 ".....3.60
32x3 ".....2.75	34x4 ".....3.95
29x3½ ".....2.55	35x4 ".....4.15
30x3½ ".....2.80	36x4 ".....4.30
31x3½ ".....3.05	40x4 ".....4.80
32x3½ ".....3.20	34x4½ ".....4.45
34x3½ ".....3.40	35x4½ ".....4.85
36x3½ ".....3.95	36x4½ ".....5.15
30x4 ".....3.05	36x5 ".....5.40

MILLER'S TIRE RELINERS—3 PLY ADHESIVE—REGULAR QUALITY

Net Prices—Cash with Order 40 and 5 per cent.
off List Prices. Can Furnish Any Size Not Mentioned.

CHAS. E. MILLER. Anderson Rubber Works,
ANDERSON, IND., U. S. A.



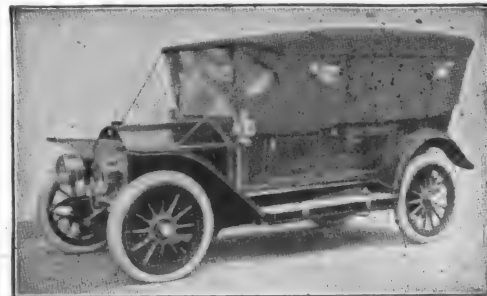
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applied
for.

The Vulcan Puller

A tool for the garage and
repair shop. Used for re-
moving automobile gears,
wheels and pulleys. Also for straightening
automobile axles and frames. A card will
bring you full description.

Winchester Machine Works
Winchester, Ind.

Our Factory Prices Save You Money



"Classy" Auto Tops,
Windshields,
Dust Hoods,
Truck Tops,
Cushions,
Slip Covers, etc.

Write Dep't D im-
mediately for full
particulars and
prices.

THE KING TOP MFG. CO., Dayton, Ohio
WHOLESALE MANUFACTURERS

Superior To Many Demountable Rims.

PATENT PENDING



Your Tire Equipment can be brought up to date by
the use of our Tire Clips.

These Clips are made to use in connection with quick
detachable clincher type tires; they hook over the beads and
hold the parts in position.

The inner tube can be properly adjusted and the tire partly
inflated before being put onto the rim. This operation can be
easily and quickly done. The locking ring can also be put in
place without trouble.

The Clips are made of light spring steel and copper plated
to prevent rusting.

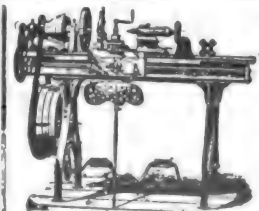
They are made to fit any size tire.

With them extra tires can be carried partly inflated.

Price for equipping five 4-inch tires and under \$1.50, and
for tires above 4-inches \$2.00, postpaid to any part of the
United States.

When ordering state size of tire, make and model of car.

DRAVER MFG. CO., RICHMOND, IND.



THE BARNES LATHES

9' swing
11' swing
13' swing

For Repair Work our No. 13 Lathe is right;
has 13' swing, auto cross feed, length of beds
from 5 to 10 feet long; furnished with counter-
shaft or foot-power.

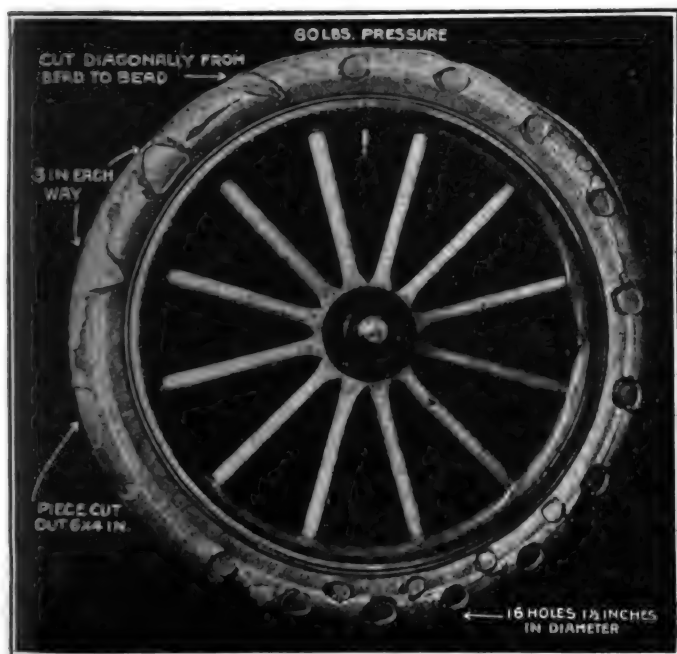
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This photograph shows a tire completely cut away in over twenty places yet securely held under full pressure by an Interlock Inner Tire.

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Understand, it is no ordinary reinforcement—no reliner or inner shoe. **Nothing that has ever been made before this year could possibly hold 80 lbs. air pressure** with the tire completely cut away.

The Interlock Inner Tire

is the reinforcement that

**Owners, Dealers and Supply Houses
Have Long Been Looking For.**

If it wasn't good we wouldn't back it. The fact that we do tells more than a dictionary full of details.

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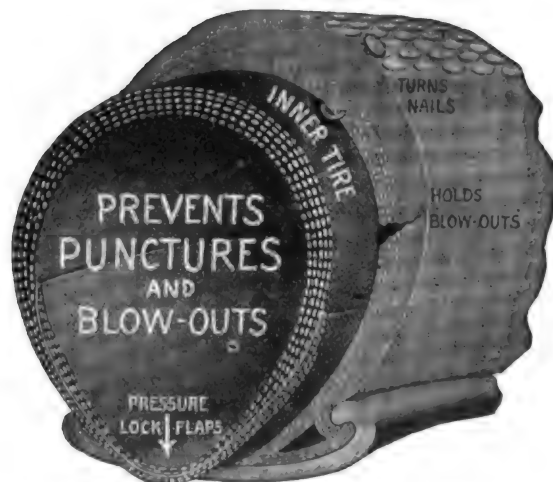
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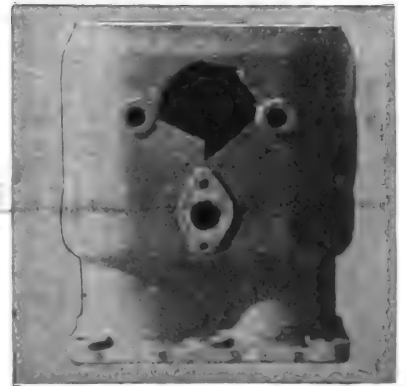
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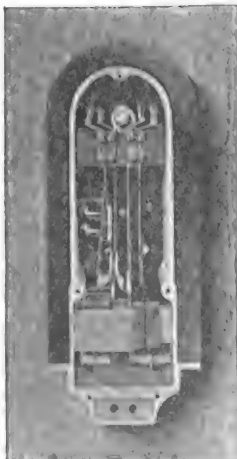
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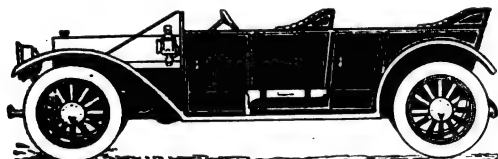
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Let Se-ment-ol be the stopper.
No removing of radiator.
No soldering.

Won't injure
metal.

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Any
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will sell you Se-ment-ol.

No car equipment
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Ask your best repair man
or write direct to

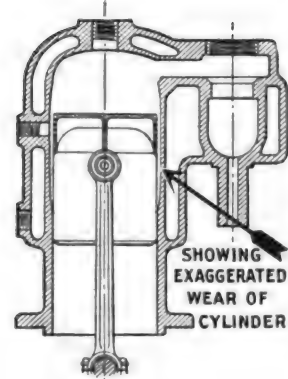
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YOU CAN NOT STOP THE WEAR IN THE CYLINDERS BUT
THE RESULTANT LOSS OF POWER CAN BE STOPPED.

HOW?

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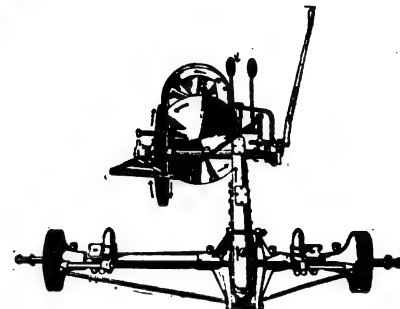
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Established 1870

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No Gears!

Notice this transmission of the Cartercar carefully. You will see that it has absolutely no gears of any kind whatever. No matter how well gear transmissions are made they will strip—and howl. There are just two unit parts to the Cartercar Transmission—affording the maximum durability, silence and efficiency.



The Friction Disc running against the fibre faced wheel gives any number of speeds—all controlled with one lever.

This adapts the Cartercar to crowded streets. It will also go through any possible roadway. The tremendous leverage provided by this transmission at low speeds will take the car up a 50% grade and through sandy and muddy roads where a gear transmission would probably be stripped.

With such simple, easy control, a boy or lady can drive a Cartercar as well as a man. The control is made more complete by three independent systems of brakes.

Every detail of the construction of the Cartercar is in keeping with the most advanced ideas of motor car building. Chain-in-oil drive, full floating rear axle, three-quarter elliptic rear springs,

long wheel base, large wheels and attractive design combine with the friction transmission to make the Cartercar the most pleasing car from every standpoint.

In winter and summer your Cartercar is always ready no matter whether you wish to take a pleasant little drive, or a long hard run.

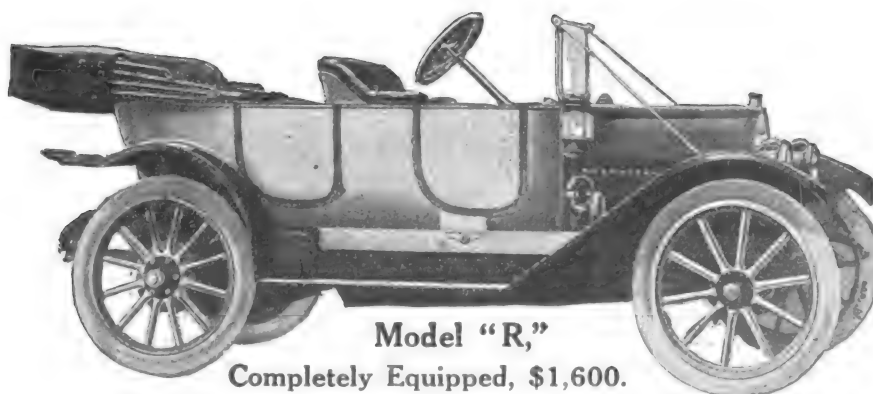
Equipment includes self starter, gas tank, top, top cover, speedometer, full lamp outfit, demountable rims, trunk rack, tools, robe rail, tonneau mat, etc.

If you want a car that will give you the utmost service and enjoyment—that is adapted to all road conditions—and is easy for anyone to drive—then you should know about the Cartercar.

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Model "R,"
Completely Equipped, \$1,600.

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The low specific gravity, and high quality, makes it possible for you to get more repairs from a given weight of Firestone than from other stocks. Consequently repairs cost you less, and your customers get the benefit of the Firestone standard of quality.

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Book Published for Repair
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asking.*

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"America's Largest Exclusive Tire
and Rim Makers,"

Akron, O., U. S. A.



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Akron, O.

Gentlemen:—
Send book, postage paid, to

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A mountain of Evidence

35,600 Replies!



We sent out cards to an ordinary mailing list. We wanted to get from motorists generally—*irrespective* of what tire any one of them might be using—their frank, *uninfluenced* opinion of tires, based on their personal experiences. We received **35,600** replies. 15,300 reported Goodrich

Tires used. Balance divided among users of eleven other makes.

These reports proved conclusively that users average 51½% more mileage than is guaranteed from

GOODRICH TIRES

and that an average of one-fifth of Goodrich Tire users never have a puncture or blowout in a *full* season's run.

Six hundred users of other tires complained about tread separating from body of tire— not a *single* Goodrich complaint of this order.

80% of these 35,600 reported that they specify "Goodrich" when new tires are needed. A frequent statement was "I am using Goodrich Tires to replace tires which came on car."

The great bulk of Goodrich Tires are sold to fill a *personal* demand from *experienced* tire users. It is needless for you to experiment when you can profit by what other motorists have learned.

"Nine prophets and a host of truly wise ones"

—our book about these reports—puts in your hands the comparative tire experiences of 35,600 car owners; users of *twelve* different makes of tires. It contains no technical claims, no talking points, no "rhetorical bonfires"; but *EVIDENCE* from those alone entitled to give it—tire users themselves.

Write for this book; it will be mailed to you gratis.

THE B. F. GOODRICH COMPANY, - - - Akron, Ohio
BRANCHES AND TIRE DEPOTS EVERYWHERE

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DON'T ANCHOR YOUR CAR

A little friction in every bearing aggregates a serious amount of undesired braking power, robbing your car of free motion, wasting energy developed by your engine and destroying moving parts

Only perfect lubrication lifts this load. Only perfect lubrication stops frictional wear on gears and bearings

In every season, under all conditions of weather and temperature



assures you perfect lubrication

Get the orange colored cans showing above trade-mark

Get the Orange Colored Cans



Note the Trade-Mark

A LITTLE HISTORY AND A SPECIAL WARNING

For over ten years NON-FLUID OIL has been the most popular lubricant for motor cars. Over seventy motor car manufacturers have tested NON-FLUID OIL against every existing lubricant, and have recommended NON-FLUID OIL to purchasers of their cars.

This fact has established the tremendous demand for this superior lubricant, but has encouraged the usual nefarious imitation by manufacturers of inferior goods.

Today there are dozens of brands of grease falsely called NON-FLUID OIL. Get the orange colored can bearing our trade-mark. The lubricant you want is recommended by over seventy motor car builders and is the product of the

Non-Fluid Oil is distributed on the Pacific Coast by
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165 Broadway, New York



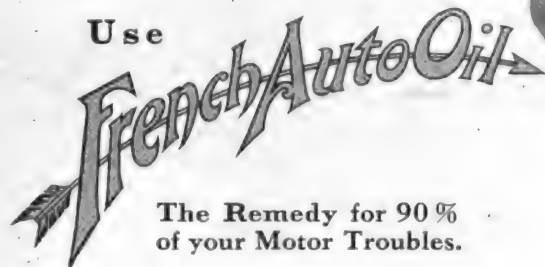
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INSIST—USE IT—YOU WIN

Inferior oil steals the excellence of your car so slowly that you are not aware of it—

—until too late—

—until damage has been done which cannot be repaired.



The Remedy for 90 %
of your Motor Troubles.

Guaranteed Lubrication

From the Premium Crude Oil of the World exclusively for gasoline motors.

The arrow always.

If your dealer doesn't have it, your order will be filled quickly by one in a nearby town.

Free booklet on request.

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Dealers—Did you receive and read your copy of this letter, which was mailed you recently?

It is far too important for you to miss.

TO THE TRADE.

Our sales record for the past year has indicated very clearly that the dealers of the country are heartily in accord with the policy of the United States Tire Company and are convinced that the United States Tire line is an extremely desirable line to handle.

We desire to show in a substantial way that we highly appreciate this attitude on the part of the trade, and to prove that this company is disposed to give back to the dealer the same confidence and co-operation which the dealer has given to it.

WE HAVE DECIDED TO WITHDRAW ENTIRELY FROM THE RETAIL FIELD, NOTWITHSTANDING OUR VARIOUS BRANCHES THROUGHOUT THE COUNTRY NATURALLY DO A VERY LARGE BUSINESS DIRECT WITH THE CONSUMER, AS IS TRUE OF OTHER TIRE CONCERNS.

Hereafter this ENTIRE BUSINESS will be thrown to the various dealers who handle our line.

We appreciate the fact that this is an extraordinary attitude for a tire concern to take with reference to retail business at its branch stores, but we regard it as an eminently fair concession for us to make, in view of the unprecedented "backing" which dealers have given to the United States Tires during the past year.

Signs bearing the wording "No goods sold at retail" have already been posted in all our branch stores, making this new ruling effective **immediately**.

Yours very truly,

UNITED STATES TIRE COMPANY.

UNITED STATES TIRE COMPANY

58th Street and Broadway

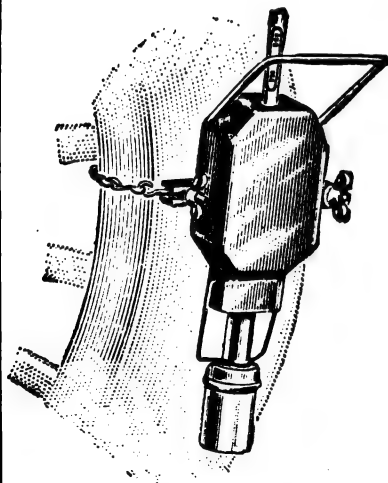
New York City

TABLE OF CONTENTS

	PAGE		PAGE		PAGE
Slide and Poppet Valves.....	33	Lubrication, Magnetos, Etc.	47	For a Heating Transmission.....	56
Adjusting the Timer.....	36	Overhauling and Spark Plugs.....	47	For Rattling Radius Rods.....	56
Hose Connections	36	Information as to Starters.....	47	Camping With a Car.....	56
More Garage Turntables.....	37	Chokes and Misses Fire.....	47	Starting by the Carburetor.....	57
A Lifting Jack.....	39	A Cylinder Misses.....	47	Some Medium Priced Cars.....	57
How To Use Nuts and Bolts.....	39	A Flooding Carburetor.....	48	A Timely Word of Caution.....	59
Care of Acetylene Lamps and Gene- rators	40	Starting, Lighting and Tire Covers.....	48	Quick Rural Mail Delivery.....	59
For Priming the Engine.....	40	Cold Weather and the Generator.....	48	Good for the Ford Car.....	59
Care of Rims, Tire and Bearings.....	41	An Ignition Experiment.....	48	Satisfactory Starting	59
Patching a Broken Exhaust Pipe or Torque Rod	41	Trouble With His Carburetion.....	49	Sam in More Trouble.....	60
Good Use for Washers.....	41	An Improvised Headlight.....	49	The Repair Shop	60
Repairing Wheels.....	42	Kerosene for Fuel.....	49	Motoring and Health.....	62
Types of Automobile Drivers.....	42	Grievances of the Dealer.....	50	Dry Batteries	63
Probably Due to Carbon.....	43	Tire Guarantees	50	Repainting Points	64
No Distributor	43	Automobile Abuse	51	Luminous Bodies for Night Driving.....	64
Needs a New Float	43	Not Wanted	51	Care Needed in Home Painting.....	64
Electric Light for Ford Cars.....	43	Suggestions and Confession.....	51	An Urgent Request.....	64
Stuck Pistons	44	In Their Own Light.....	51	Automobile Associations.....	64
Carburetors	44	Let Well Enough Alone.....	51	How to Make Friends.....	65
Several Queries Answered.....	44	A Hundred Per Cent. Increase.....	51	Magneto and Engine Design.....	65
Uses Too Much Oil	44	How To Double the Food Supply.....	52	Tool Box in Tonneau	67
Why It Pounds.....	44	Wire Wheels	52	Lessons for Drivers.....	67
Too Rich Mixture.....	45	The Elmore Two Cycle Engine.....	52	Side Curtains	68
Six Cylinders and Carburetors.....	45	The Kind of a Car Needed.....	52	Rear Tire Holders.....	68
Auxiliary Air Exhaust.....	45	An Unusual Accident	52	Classified Advertisements	68
A Bent Crankshaft.....	45	Effect of Cold on Dry Cells.....	52	Oil Can Holder.....	68
Transmission Trouble	45	Some Experiences of a Dealer.....	53	Front Number Holder.....	68
Lubrication	46	Air Compressing	53	Fierce Clutches	68
Compression Leaks	46	Ignition, Lights and Starters.....	54	Heat Your Gasoline.....	70
The Engine as a Brake.....	46	Guarantee of Tires.....	54	Who Can Tell About the Yale Car?..	70
Muriatic Acid	46	Information for Ford Users.....	54	Steam Car Department.....	70
Setting a Shock Absorber.....	46	An Interesting Experience.....	55	To Inexperienced Stanley Owners.....	71
Tire Pumps and Pressure.....	46	Making a Sleeping Car.....	55	Steam Car Lubrication.....	72
Wiring Connections	47	Use and Care of Tubes.....	55	Gasoline and Steam Cars.....	72
		Advice to Ford Owners.....	55		
		Taking Care of Tires.....	56		

E-Z-2-Work Steam Vulcanizer—\$9.00

Regular Price, \$15.00



eliminates all danger. It is "Easy-to-work," and any boy who can read can do perfect work. If it is not satisfactory in every respect, we will refund full amount paid.

The E-Z-2-Work Steam Vulcanizer Co.
Cleveland, O.

To thoroughly introduce our already famous E-Z-2-Work Steam Vulcanizer in every corner of the U. S., we will furnish a complete outfit, including all rubber, cement, full instructions and everything ready to start work at our very best agents' price of \$9.00 (regular price \$15.00), to the first man ordering one from each town. Generates its own steam, heated by wood alcohol lamp, repairs both tubes and casings of any size, can be used in country or anywhere, and best of all, it will not burn your tires, as the steam

Your Idea of Enthusiasm Is Limited—

unless you've heard a Ford owner discuss the Hagstrom Spark Plug—"the plug with the porcelain guard."

When you pay \$1.00 for a spark plug you are entitled to a plug of Hagstrom quality. But paying that price seldom gets it.

Your dealer will furnish Hagstrom Plugs—if you insist.

Write to-day for a gas tank key—and for descriptive matter of the improved suction Priming Cup and other Hagstrom specialties, to



The Hagstrom Bros. Mfg. Co.

Dept. D, LINDSBORG, KANSAS. Or,
LOWE MOTOR SUPPLIES CO., New York City Distributors.

\$1,000 CASH REWARD



SEND 5 CENTS IN STAMPS FOR PICTURE IN COLORS

THE BRICTSON MFG. CO. Have set aside \$1,000.00 in cash, which they offer to pay to any person or persons that can run more miles on a set of Pneumatic rubber tires **WITHOUT** Brictson Detachable Treads applied than **WITH**. This offer is open to the **MOTORING PUBLIC** including the **MANUFACTURERS** of RUBBER TIRES. Remember, this is a CASH "proposition"—none of your **CHEAP** "trophies," with an inflated valuation.

THIS IS A REAL BLUFF—WHO WILL CALL IT?

Now, Mr. "Free Adviser," You who are always so vitally interested in advising some fellow motorist against using Treads, whispering confidentially in his ear that he must not use them as they will ruin his tires, cause blowouts, heat the tubes and cause them to break—and all such foolish and untrue talk that has been "trumped" up by some one interested in keeping down the sale of tire protectors, something that is a **REAL NECESSITY**—that **ALL MOTORISTS SHOULD HAVE**—here is a chance to prove your statements. We stand ready and willing to prove ours. Now, if you **KNOW** so much about the "**TIRE GAME**" get busy at once, for according to **YOUR** advice, the \$1,000.00 will be "**EASY MONEY**."

CONDITIONS OF THE CONTEST

THE BRICTSON MFG. CO. Will use the same 66-H. P. six cylinder, seven passenger Pierce-Arrow car herein above illustrated, weighing 6500 pounds, fully equipped with "**BRICTSON**" **DETACHABLE TREADS**, that won the tire test last July in the "**TWIN CITY TO HELENA AUTO TOUR**," and which was also **OFFICIAL PRESS CAR AND STARTER** in 1911 **BIG GLIDDEN TOUR**—New York City to Jacksonville, Florida.

THE CONTESTING CAR shall be one of same size and weight, using exactly the same size tires and tubes, and the tires and tubes on both cars must be exactly alike, so that one contestant will not have unfair advantage of the other.

The same schedule of **TWENTY MILES PER HOUR** shall be maintained—the same as in all **A. A. A.** tours for this class of cars. Each party shall have the privilege of furnishing an observer, who shall be a passenger in the contesting car. The run shall start from Brookings, S. D., and extend West to Los Angeles, California, and return.

TO LIVE DEALERS.

Do you realize that "**BRICTSON**" **DETACHABLE TREADS** are the best tire protectors on the market and that 1912 Models are even superior to the 1911 treads that made such a sensation in **THE TWIN CITY TO HELENA TOUR**, also the **Big Glidden Tour** (New York City to Jacksonville, Florida)?

Isn't it about time you were getting in line to reap your share of the profits from their sale in your territory? Some one will if you don't.

It is getting to a point now where Brictson Agencies are at a premium. Why not beat the other fellow to it and stick to it after you do get it, for the longer you have the **BRICTSON AGENCY** the greater asset it becomes. Send the coupon in the lower left hand corner of this page and we will do the rest.

**THE
BRICTSON
MFG. CO.,**

**122 Brictson Building,
Brookings, South Dakota.**

Without obligation on my part, send me your dealer's price list and full particulars.

Name.....
Address.....

DEALER'S COUPON

**THE BRICTSON MFG. CO.
BROOKINGS, S. D.,
U. S. A.**

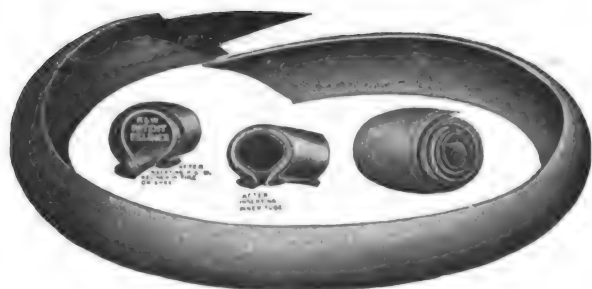
MOTORIST'S COUPON

I am interested and would like to know more about "**BRICTSON**" **DETACHABLE TREADS**. Send me your booklet, "**The Expense**" proofs from Automobile owners.
Size of Tire.....
Name.....
Address.....

**THE
BRICTSON
MFG. CO.**

**122 Brictson Building,
Brookings, South Dakota.**

ANNOUNCEMENT



For several years we have been manufacturing K & W Patent Reliners. We made them inner-shoes "second to none" in giving service.

As there are many instances where a Reliner would do all work required in reinforcing and preventing punctures (and sometimes not necessary to be made of as good material as our K & W Patent Reliners), we have decided to manufacture a Reliable Low-Priced Tire-Reinforcement and have succeeded so well that "price and quality" will satisfy anyone who is satisfied with any other tire protector on the market. We call it the

DANDY RELINER

The "DANDY" Reliner is built wide (so it will reinforce casing at edges) of 3 to 5 plies of heavy rubber duck—(not 2 or 3 of light 8 or 10 oz.). Neatly made. Fits the tire. Heavily CEMENT COATED—ready to insert. SEMI-CURED and very pliable. Made according to the Combined Principles of two U. S. Patents (same as our K & W Patent Reliners or Best Grade)—making the "Dandy" SUPERIOR to other makes.

Our Dandy gives Excellent Service. Read this:

Gentlemen:

Will say we have used your "Dandy" Reliner on casings that were really gone—and must admit gave perfect service and satisfaction.

Donaldsville, La., December 2nd, 1911.

MAURIN CO., Ltd.

We also manufacture a LIGHT WEIGHT Reliner (just like above) only of "two" layers. The LIGHT WEIGHT is excellent for a tire that is "ROUGH INSIDE."

PRICE LIST.

Dandy Reliner	Light Weight Reliner	Dandy Reliner	Light Weight Reliner	Dandy Reliner	Light Weight Reliner	Dandy Reliner	Light Weight Reliner
30x2 1/4.....\$2.10	30x3 1/4.....\$2.40	30x3 1/4.....\$2.40	30x4.....\$2.80	31x4.....\$2.20	31x4 1/2.....\$2.50	34x4 1/2.....\$4.00	34x5.....\$4.50
30x3.....\$2.40	30x3 1/2.....\$2.80	32x3 1/4.....\$2.80	32x4.....\$3.20	32x4.....\$2.40	32x4 1/2.....\$2.80	36x4 1/2.....\$4.50	36x5.....\$5.00
30x3 1/2.....\$2.80	30x4.....\$3.20	34x3 1/4.....\$3.20	34x4.....\$3.60	33x4.....\$2.80	33x4 1/2.....\$3.20	34x5.....\$4.50	34x5 1/2.....\$5.00
30x4.....\$3.20	30x4 1/2.....\$3.60	36x3 1/4.....\$3.60	36x4.....\$4.00	34x4.....\$2.80	34x4 1/2.....\$3.20	36x5.....\$5.00	36x5 1/2.....\$5.50

Prices subject to change without notice. Above prices subject to 5% discount for cash.

FULL DIRECTIONS for inserting included with each Reliner.

Although the Dandy gives great service and will Revolutionize the Reliner Business, we advise if you want SOMETHING SUPERB "to write us" for description and prices on our K & W Patent Reliners which we have been making for the past three and one-half years and have been asked to replace less than 1/2 of 1%.

K & W "PATENT" RELINERS Are Fully Guaranteed

Our 1912 Catalog is ready and among other TIRE-ACCESSORIES are the following:

Extra Heavy Clincher Patch

Heavy Blowout Patch



Saves Carrying an Extra Tire. Enables You to "Get Home." Strengthens at Rim as well as on Tread.

This patch is made from 10 to 14 inches long and of from 4 to 6 plies of very heavy fabric. One ply is made wide enough to go under both clinchers. Shaped to fit curve of tire.

Smoothly finished and neatly packed in single carton.

This patch should be cemented into the tire over very bad fabric breaks or small blowouts and will make the tire very strong and smooth.

Made of 3 to 5 plies of heavy fabric moulded and shaped to fit the tire.

A High Grade Patch at a Low Price.

This Plaster, made of 5 plies of heavy fabric—3 outside, is uncured. Use it over fabric breaks.

Auto size, 7x8 inches. Price, prepaid, 40 cents.

Motor Cycle size, 4x5 inches, 3 plies. Price, 25 cents.

Packed in Waxed Envelopes.

Price Each.

2 1/4 inch.....\$.75	4 inch.....\$1.50
3 ".....1.00	4 1/2 ".....1.75
3 1/2 ".....1.25	5 ".....2.00

Price Each.

2 1/4 inch.....\$0.50	4 inch.....\$1.00
3 "......65	4 1/2 ".....1.20
3 1/2 "......80	5 ".....1.50

K & W Special Reliner Cement or Compound. To be used when inserting Reliner second time.

Pint, 60c.; Quart, \$1.15; Gallon, \$4.25.

DEALERS: Our TIRE ACCESSORIES are the best for you "to sell" and your customers "to use." Write us at once for Agency Proposition.

CONSUMERS: If your dealer or Tire-Repairman does not sell K & W Reliners, Patches, Cements, etc., he has nothing "just as good," so write us and we will prepay Express for cash with order, and if goods on arrival are not satisfactory, return them to us (at our expense) and we will refund your money. Write for our 1912 K & W Calendar.

& W MFG. CO., 3rd St., Ashland, Ohio

Automobile Dealer and Repairer



A JOURNAL OF PRACTICAL MOTORING

REGISTERED IN U. S. PATENT OFFICE.

THE MOTOR VEHICLE PUBLISHING CO., 71-73 Murray Street, New York.

Vol. 13, No. 2

NEW YORK, APRIL, 1912.

Monthly, \$1.00 per year.
Single Copy 10 Cents.

Our Catalogue De Luxe is Out

Send for it

--if you have ever thought of buying a Maxwell car--if you now own a Maxwell--if you ever did own one--or if you have ever had any interest in the Maxwell. Just say on a postal: "Send Catalog."



The Winning Maxwell Team in the Glidden Tour Entering Atlanta

DEFEATING 63 other contestants, breaking all previous efficiency records, winning every trophy and prize money in its division, the Maxwell Team of three touring cars won the last Glidden Tour as the only team to travel over 1454 miles of America's worst roads from New York to Jacksonville, Fla., with an absolutely perfect score.

The victory was decisive and unprecedented,

and carried with it the justly earned title of "America's Touring Champion."

Practically every American automobile was represented--some costing as high as \$6,000. Maxwell Cars cost from \$600 to \$1480.

United States Motor Company

Maxwell Division

6 West 61st Street

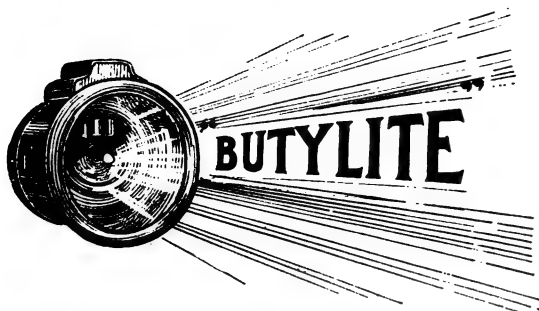
New York City

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The Table of Contents will be found on Page 124

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**The Latest in Automobile Lighting
NO TANKS—NO TUBES**



Automobile Headlights

With Alcohol (obtainable anywhere), as Fuel.

COMBINES EFFICIENCY WITH ECONOMY.

One Cent an Hour

Is the astonishing low cost of operating the nine inch lamp. The light is white and mellow; has 600 feet throw and 250 feet spread with unimpaired intensity, lighting both corners when turning.

Self Contained Feature.

The BUTYLITE lamp is self contained, that is, it has no tanks or connections with any source for the operation of lighting or keeping alight outside of itself. Lamp can be removed—its light used in any position; very convenient in case of breakdown or emergency. Liberal discounts to jobbers and dealers.

AGENTS WANTED IN EVERY CITY AND TOWN.

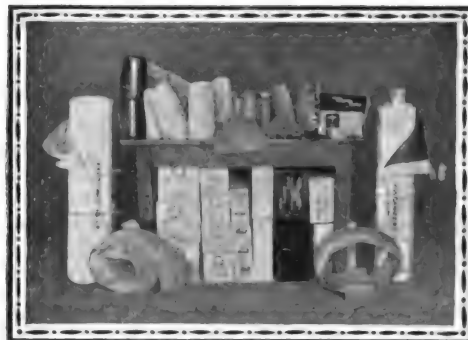
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"BUTYLITE"

32 UNION SQUARE, EAST, Dept. A. NEW YORK CITY

**VOORHEES "IDEAL"
AUTOMOBILE RUBBER SPECIALTIES**

*TO SAVE EXPENSE AND
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Ask nearest dealer or write to us direct.

**Disease Cannot Be
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OXYDONOR**

Opens the way to good health. Oxydonor is a reform—not a medicine. Oxydonor is the means to an end. Oxydonor is Nature's way for destroying disease of every character promptly, painlessly and inexpensively. Originated and invented by a physician and scientist. Endorsed by physicians.

If you are sick, if you are suffering from any form of disease, acute or chronic, why not investigate the merits of Oxydonor? Why not be guided by the testimony of thousands of people who have been brought from sickness to good health by Oxydonor?

**Oxydonor with full directions will be
SENT ON 60 DAYS' TRIAL.**

If not entirely satisfied with results at the end of that time, the purchase price, \$25.00, will be cheerfully refunded.

Free Books sent prepaid for the asking. Write to

DR. H. SANCHE & CO., Inc.,

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**"The Brake Lining of Quality"
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Qualities,
and
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Resistance.

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Detroit, 1598 Woodward Ave.

Buffalo, 720 Main St.

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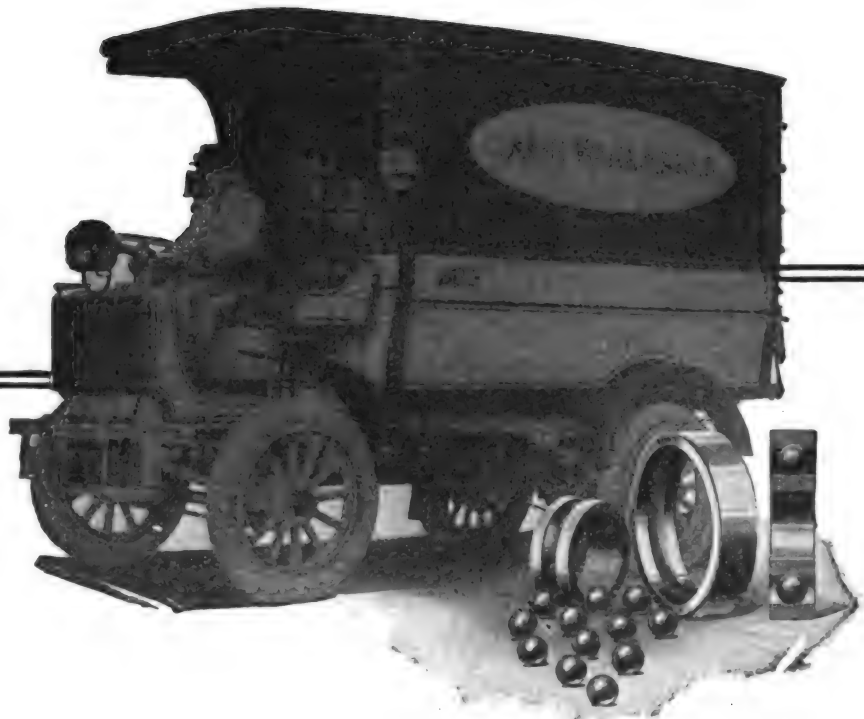
Troy, N. Y., 422 River St.

St. Louis, Capen Belting & Rubber Co.

San Francisco, Fred Ward & Sons.

New York, 237 Lafayette St.

**Autocar 3000 lb. Truck
Equipped with
Hess-Bright Ball Bearings
on Engine Crankshaft**



Adjustment versus Non-Adjustment In Ball Bearings

The advantage of the annular ball bearing over the cup and cone type lies (for equal quality and finish otherwise) mainly in its absence of adjustment.

If the cone in the sketch be stationary (e.g., the spindle of an axle), the result of the localized wear A of the cone will be to throw the hub axis out of line with the spindle; and this cannot be corrected by setting up the adjustment.

The correct fit of balls and races in any ball bearing is a matter of extreme delicacy, and if left to the individual judgment a high degree of skill is needed to obtain the full degree of durability of that bearing. If the adjustment is left to the individual user or repairer, the life of the bearing is certain to be greatly shortened. Hence it is better to provide no adjustment, and to select a bearing large enough to avoid appreciable wear.

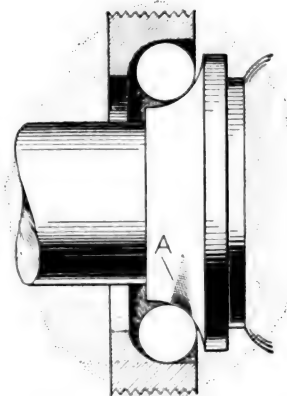
Hess-Bright balls and races are graded in diameter to the small fraction of the tenth of one-thousandth of an inch. For each pair of races, balls of a precise selected diameter are used, so that they shall have a minute but definite freedom between the races. This is in order to avoid cramping due to slight distortions of the shaft or housings.

Free to Engineers

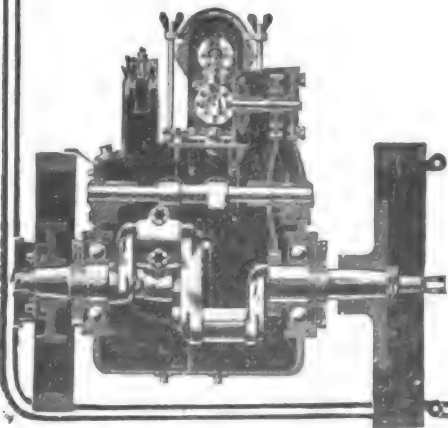
The theory and principle of ball bearings are covered fully in the Hess-Bright Catalog. Both the Catalog and the Hess-Bright Data Sheets of ball bearing applications should be in every engineer's library. If they are not in yours, write us to-day.

Write on the stationery of your company

**THE
HESS-BRIGHT
MANUFACTURING CO.**
2119 Fairmount Ave., Philadelphia



Showing effect of Wear in a Cup and Cone Bearing



Please mention the Automobile Dealer and Repairer when writing to advertisers.



Guaranteed 5000 miles without puncture

DO YOU KNOW THAT tire wear costs from $1\frac{1}{2}$ to 4 cents per mile, depending on the size?

DO YOU KNOW THAT during the coming season this expense will total from \$50.00 to \$200.00 on your car? **Figure this for yourself.**

DO YOU KNOW THAT no matter whether your tires are new or old; thread-worn, rut-worn or rim-cut, you can save one-half of this and have that saving positively *guaranteed* to you if you will equip your car with **Durable Treads**?

Thousands of careful Motorists who have figured the cost of tires are doing this and are enjoying absolute freedom from tire trouble, puncture, blow-out and rim-cut. **Why not you?**

Durable Treads cost about *one-half as much as tires*. They are delivered for your inspection before you pay for them, and what is equally important, remember they are delivered to you with our written guarantee that they will not heat, rot or injure the tire in any way and will wear 5000 miles without a puncture.

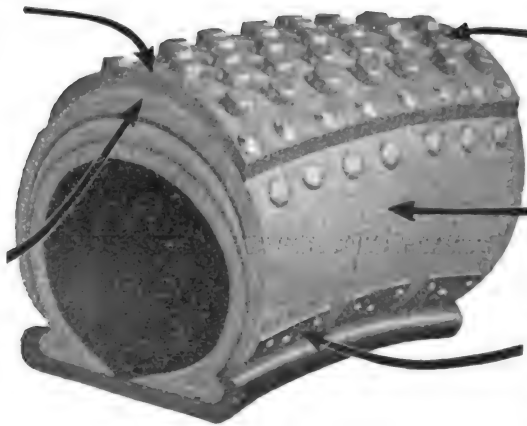
Extra Tread Strip Covers Wearing Surface; adds 50% to Life of Protector.

Hardened Steel Rivets Closely Set On Tread Surface Stops Skidding.

3 to 5 Piles of Tire Fabric Prevents Stretching or Sagging.

Full Cover Leather Protects Tire From Rut-Wear; Prevents Blow-Out.

Nickel Steel Rim Attachment Places Driving Strain on Wheel; Not on Worn or Weakened Tire; Prevents Rim-Cut; Makes Blow-Out Impossible.



We might build a protector without the tire fabric; without the extra tread strip; we could use one-half the number of steel rivets that we do and Leather of one-half the thickness. The appearance on paper would be the same and we could sell it for the same price just as other manufacturers are doing, but we could not sell it under written guarantee of "5000 Miles Without Puncture." This we are doing, and with eight years experience in building Tire Protectors, we are putting the best we know into **Durable Treads**.

Without the tire fabric, the extra tread strip, the heavy leather and the liberal use of steel rivets we could not meet the conditions of this guarantee. **We know, because we have tried it.**

SPECIAL OFFER.

If we are not represented in your locality at present we wish to be. During the next 60 days we will complete our 1912 Agency appointments. If you are interested write us for Agency Proposition and Discounts.

Our New 1912 Booklet "5000 Miles Without Puncture" is fully descriptive of **Durable Treads**, and with it we will send a copy of our Written Guarantee.

WRITE NOW.

A POSTAL WILL DO.

COLORADO TIRE & LEATHER CO., 1027 Broadway, DENVER, COLORADO

No one lubricating oil is best for all cars. This is absolute.

We will make it clear.

But, first, in the light of careless statements on lubrication, we will make plain our right to speak with authority.

UNDER its Gargoyle trademark the Vacuum Oil Company supplies lubricants to—

The floating armament of the world's leading naval powers.

To leading ocean steamship companies throughout the world.

Outside of the American market, to over seventy foreign automobile manufacturers.

To practically every aeroplane in active use, both private machines and the military aeroplanes of the leading powers.

To leading manufacturing plants at home and in every quarter of the globe.

For over half a century we have made lubricants, not as by-products, nor as temporary profit makers, but as a serious business.

In power-engineering circles, our standing as the authoritative leaders in high-grade lubricants is unquestioned.

TURNING to automobile lubrication:

Carbon deposit, as a factor, is widely misunderstood.

Proper filtration will remove, from lubricating oils, the greater part of the

free carbon. But lubricating oils are a hydro-carbon product.

In burning, they must leave some residue.

The amount of carbon deposited in the cylinders depends partly on the carburetion and gasoline combustion, partly on the oil, partly on its fitness for the car.

The majority of cars, in using the oil best suited to them, get the greatest freedom from this annoyance.

But carbon deposit is generally a dangerous guide in choosing the correct lubricating oil for a particular car.

There is only one guide that is sound.

What oil yields the highest horse-power?

You may not care for speed. But, to safeguard your car, you do want its greatest horse-power efficiency.

Wasted horse-power results from restrained action—either from friction or some other injurious deterrent.

As oil saves power, it follows that one oil saves more power than another.

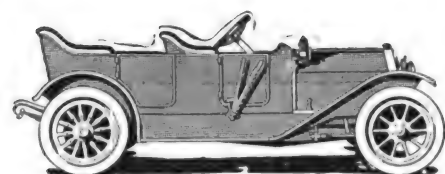
To get the highest horse-power from your car, you must use the lubricating oil best suited to it.

It is of the utmost importance that you use that oil and no other.

No one would think of using the same lubricant for a sewing machine and a battleship.

The needs of two motor cars often differ quite as widely.

The correct oil for a Fiat, for instance, is absolutely the wrong oil for a Packard.



This list shows the right oil for your car

In the schedule, the letter opposite the car indicates the grade of Gargoyle Mobiloil that should be used. For example, "A" means "Gargoyle Mobiloil A." The meaning of the marks * † ‡ is shown at the bottom of the page. For all electric vehicles use Gargoyle Mobiloil A. The recommendations cover both pleasure and commercial vehicles unless otherwise noted.

Model of	'08 '09 '10 '11 '12	Model of	'08 '09 '10 '11 '12
Abbott Det.	A1A1A1	Cadillac (1).	A1B*
A B C (air).	B*B*B*	Cadillac (4).	A1†
A B C (wat.)	A1A1†	Cameron	B†B†B B*B†
Acorn	A A A	Cameron Com.	B†
AdmaFarwell	B*B†B*B*	Carhartt	A1A1†
Aiko	† † †	Carlson	A1A1†
Allen King	A1A1†	Cartiercar	A1A1A1†
American	A1A1A1A1†	Cartiercar Com.	B*A A1A1A1†
Am. Eagle	† A1A1A1†	Case	A A1
Am. La F.	A A A	Case	A1A1†
Amplex	B*B*B*B*	C. G. V.	A1A1A1†
Ann Arbor	B*	Chadwick	A A B*A1A1†
Apperson	E A1† † †	Chalmers	† † † A1†
Atlas	A E E E A	Champion	A1A
Atlas Com.	E E † A	Charon	A A
Atterbury (2)	E E † A	Chase	B B B B
Atterbury (4)	A1A1A1†	Cino	A1A1A
Auburn (2)	A A A E	Cino Com.	A1A1†
Auburn (4)	A1A1A A	Clark	A A A
Austin	A A1A1A1A1†	Clark Chicago	A A1A1†
Autocar (2)	B*A1A1A1†	Clark Lang	A A A
Autocar Com.	A1A1A1A1†	Clem. Bayard	E A A A
Autocar (4)	A1A1A1A1†	Club Car	A1†
Avery	A1A1A	Colburn	A A
Babcock	A † †	Colby	† † †
Babcock Com.	A † †	Cole	† A1†
Baker	E E	Coleman	B E
Barker	A	Columbia	A1A1E A A
Barre	A†	Columbia Kt.	A A
Beiden	E E	Conimer	A A A
Benx	A A A A	Commerce	E
Bergdoll	A1A1†	Commercial	A A
Berkshire	A† † †	Continental	A A † †
Best	A B*	Corbin (air)	B†B†B†
Beyer Det.	A A	Corbin (wat.)	A1A1A1A1†
Black Crow	A1A1†	C. P. T.	A A A
Blair	A†	Correja	A1A1A1A1†
Boyd	A A1A	Cortland (air)	B*B*
Brodeser	A A1A	Cortland (wat.)	A1
Brooks	B	C. P. T.	A A A
Brush	A A1A1A1A1†	Couple Gear	A A A A1†
Bulck (2)	A A A A A	Crane & Breed	A1
Bulck (4)	A1A1† A1A1†	Crawford	B*B*A1A1A1†
Burns	B†B B*B*	Crow	A1A1†
		Crown	B A A

* Use Gargoyle Mobiloil A in winter

† Use Gargoyle Mobiloil E in winter

Model of	'08 '09 '10 '11 '12	Model of	'08 '09 '10 '11 '12
Cunningham	A A	Duryea	D*B B B A
Curtiss	A	Dynanic	A1A1†
Cutting	A1A1A1†	Eclipse	A1†
Daimler	A1A1A1A1†	Economy	A A
DaimlerKight	A A	Elmore	A A A
Daln	A A	E. M. F.	A1A1A1†
Darracq	A1A1A1A1†	Empire	A1A1A1†
De Dion	A A A A	Enger	B B A1A1†
Davis	† † †	Etmyre	A1E
Deal	A A	Everitt	A1A1A1†
Decatur	A A A1†	Ewing	† † †
De Dion	B*B*B*B*	Falcar	A1A1†
Delabaye	A A A A A	Federal	B* E A
Del. Believ.	B*B*B*B*B*	Flat	A1B*A B*A
Denniston	A1A	Firestone	A1A1A1†
De Tumble	A1A1A1†	Flanders	E E †
Det. Dear'n	A1A1†	Ford	A1E A1E E
Diamond	A1A A A A	Fort Wayne	A A
Dispatch	E	Franklin	B†B†B†A1†
D. O. E.	A1A1†	Frank. Com.	B†B†B†A1†
Dorris	A1A1A1A1†		

† Use Gargoyle Mobiloil Arctic in winter

Model of	'08 '09 '10 '11 '12	Model of	'08 '09 '10 '11 '12
Frayer Miller	B†B††	Havers	A1A1†
Frontenac	A A A1†	Haynes	A1A1A1A1†
Fuller	A A A1A1†	Henry	A1A
Fuller Com.	A	Herrshoff	A A A1A1†
Gaggenau	A A	Hewitt (2)	A A A1†
Garford	A1A1A1A1†	Hewitt (4)	A A1A1A1E
GarfCom.	A A1†	Hitchkiss	A1A1A A A†
G. J. G.	A1†	Hudson	† † † A1A1†
Gleason	A1A	Hupmobile	† † †
Gilde	A1A A1A1A1†	Ideal	A A A
Gramm	A1A1A1A1†	Imperial	A† †
Gramm Logan	A1A1†	Indians	A A
Grabowsky	A B*A	International	B*B*B*B*
GreatSmith	A1A1A1A1†	Interstate	A1A1A1A1†
Gt. Western	B A †	Isotta	A1A A A A
Grout	A A A A1A1†	Italia	A A A A A
Halladay	A1A1A1A1†	Jackson (2)	A A A
HartKraft (2)	A A A	Jackson (4)	A1A1A1A1A1†
HartKraft (4)	A1†	Jeffrey	† † †
Harrison	A1A1A1†	Jenkins	A A1A1E †
Haftild	B* † B1A	Johnson	A1A1A1†

† Use Gargoyle Mobiloil Arctic

TO THE TRADE The above appears as a double-page announcement in the "Saturday Evening Post," "Collier's," "Literary Digest," and "Scientific American" (issue of April 27), and in "Life" of April 18th. A series of announcements will follow in

Please mention the Automobile Dealer and Repairer when writing to advertisers.

The spring-strength of the piston rings must be considered; the fit of the piston ring into its recess; the length of the crank-shaft and connecting-rod bearings; the feed-systems; the length of the vacuum period, while intake and exhaust valves are both closed.

Before anything like correct lubrication can be determined, these, and other important considerations, must be known and studied.

IN planning for a complete range of automobile lubricants, we first analyzed the construction of every domestic car and practically every foreign make.

Altogether we found that they required five distinct grades of lubricating oil. We then produced the oils.

So far as it was practicable, we filtered out the free carbon.

We verified the fitness of these oils by frictional horse-power tests on many cars they were intended for.

All the oils were put through practical demonstrations on their respective cars.

The test-results called for some changes, which we made.

Our ultimate findings are shown in the list at the bottom of this page. You will see scheduled there the correct oil for your car.

Some cars change type from season to season. The list gives the oil required for each season's type.

In selecting from this list you may rely on three things:

First: In quality, the oils establish a world-standard.

Second: The grade indicated for each make and each season was arrived at, not by guess, but by careful study. It was later verified by thorough demonstrations.

Third: We recommend for your use the oil scheduled opposite your car.

In engineering circles that would carry more weight than anything we have said above.

Old, badly-worn cars sometimes need a heavier oil than the same cars require when new. If your car is in that state, we shall be glad to recommend the oil for it. In writing, give the make of the car, the date of the model, the approximate mileage to date, and, so far as you can, its general condition.

The quality of Gargoyle Mobiloil necessitates a price that is somewhat higher than that of the usual automobile lubricating oils.

However, their use should result in an actual saving. Properly used, they will go farther than less correct oils.

Gargoyle Mobiloils are supplied to owners through garages, auto-supply stores, and others who handle lubricants.

If the retailer who generally supplies you carries no stock at present, you should have no difficulty in securing through him the grade of Gargoyle Mobiloil you require.

The various grades go by the following names:

- Gargoyle Mobiloil "A."
- Gargoyle Mobiloil "B."
- Gargoyle Mobiloil "D."
- Gargoyle Mobiloil "E."
- Gargoyle Mobiloil "Arctic."

They are put up in barrels, half barrels, 1n, and 1 gallon cans. All are marked with our Gargoyle trademark.



Mobiloil

VACUUM OIL COMPANY, Rochester, U.S.A.

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Vacuum Oil Co. of South Africa, Ltd. CAPE TOWN	Vacuum Oil Company COPENHAGEN	Vacuum Oil Company, S.A.I. GENOA	
Deutsche Vacuum Oil Company HAMBURG	Vacuum Oil Company HELSINGFORS	Vacuum Oil Company HONG KONG	Vacuum Oil Company KUBE
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	Vacuum Oil Company, A.B. STOCKHOLM		

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Jonz	E B A A A	Lion	E E A A	Maxwell (1)	E E E E E	Morse	A A A A
Kato	A A A A	Little Four	A A	Maxwell (4)	E E E E	Napier	A A A A A
Kearns	A B A A	Locomobile	A A A A	Melselbach	B B B B	Natco	A A
Kearns Com'l	A A A	Lorraine	A A	Mercedes	A A A A A A	National	A A A A A A
Kelly	A A A A	Lozier	A A A A	Merck	A A A A A	Norwalk	A A A A
Kenmore	B B A A	Luverne	A A A A A	Mercury	B B	Oakland	A A A A A
King	A A A A	McFarland	A A A A	Meteor	A A A A	Ohio	A A A A A
Klimel-Kar.	A A A A A A	McIntyre (air)	B A A A	Mets	B B B A A	Oldsmobile	A A A A A A
Km-KarCom.	A A A A A	McIntyre (wat.)	A A A	Michigan	A A A A	Oliver	A A A A A
Kline Kar.	A A A A A	Mack	A A A A A A	Middleby	B B A A	Opel	A A
Knox	B B B B B B	Mals	A A A A A	Midland	A A A A	Otto	A A A A
Koehler	A A	Marathon	A A A A A	Minerva Kgt.	A A A A	Overland	A A A A A
Koehler Com.	A B	Marion	A A A A A	Mitchell	A A A A A	Packard	E E E E E
Krit	A A A A	Marmon	B A A A A	Moeller	E A	Paige Detroit	E A A A
Lambert	A A A A A	Mason	A A A A A A	Moline	A A A A A	Palmer Sing'r	A A A A A
Lambert Com.	A A A A	Martin (2)	A A	Monarch	B A A A	Panhard	A A A A A A
Lancia	B B B B B B	Martin (4)	A A	Monitor	A A A A	Panhard Kgt.	B B B B
Lault Juerg's	A A A	Marquette	A A	Moon	A A A A A	Parry	A A A A A
Leader	A A A	(For '08 '09 '10 & '11 see		Morgan	A A A A A	Peterson	A A A A A
Lexington	A A A A	Welch & Welch Det.)				Peerless	A A A A A

* Use Gargoyle Mobiloil A in winter

† Use Gargoyle Mobiloil E in winter

‡ Use Gargoyle Mobiloil Arctic in winter

§ Use Gargoyle Mobiloil Arctic

these publications, and, later in leading monthly magazines. We will run similar announcements continuously in leading automobile journals. We would advise dealers to stock promptly with the various grades of Gargoyle Mobiloils.

Please mention the Automobile Dealer and Repairer when writing to advertisers.



TRY IT YOU'LL FIND IT THE BEST AUTO SOAP YOU'VE EVER USED

WE KNOW, and so do our thousands of regular customers, that as an automobile soap, "BUCKEYE CLEANSER" is in a class by itself.

But we're not appealing to our present customers, they already know how good "BUCKEYE CLEANSER" really is. We want to convince the man who has never used "BUCKEYE CLEANSER" that it is the one soap that will keep his car looking as clean and bright as the day he bought it.

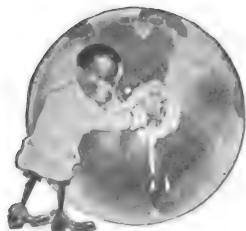
"BUCKEYE CLEANSER" is different from any other auto soap on the market. In the first place it's pure. It is made from pure vegetable oils and does not contain a trace of alkali, rosin or lye.

Another good thing about "BUCKEYE CLEANSER" is that it is just as good for the piano, furniture or woodwork as it is for the car. In fact it's good for anything at all that needs cleaning.

"BUCKEYE CLEANSER" is cheap too, because half as much goes twice as far.

Now, Mr. Auto Owner, we want you to try "BUCKEYE CLEANSER" at our expense. One trial will convince you that it is just as good as we claim it to be. If you'll drop us a postal, we'll send you enough "BUCKEYE CLEANSER" to wash your car.

WRITE FOR THIS SAMPLE TO-DAY.



THE J. P. DAVIES COMPANY

DAYTON, OHIO

"BUCKEYE CLEANSER" is sold by dealers, jobbers and garages everywhere.



Insist on this
Label

THE "INNERSHU"

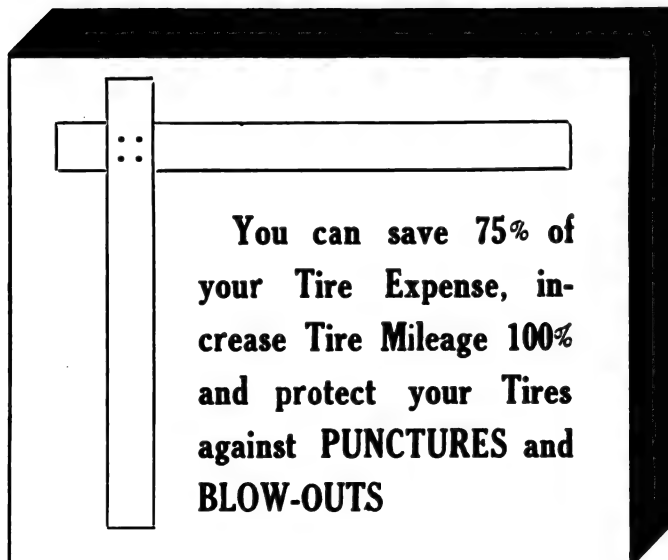


It is found on
Every "Innershu"



A 100% Increase in Tire Efficiency

GUARANTEED



**We will ship DIRECT IF not represented in
your territory**

INNER SHOE TIRE CO., Grand Rapids, Michigan

Revitalize Your Car!

You can have the latest and best magneto in the world installed on your car for less than repair bills on your old ignition.



New Remy Type RD
7½ inches High; 4½ inches Wide; 7¾ inches Long
Weights, 20½ pounds

REMY SERVICE

Why not have the finest technical organization in the ignition field right behind you seeing that your ignition is perfect at all times. This country-wide Remy service has been established for users of Remy equipment. Each station in the cities named below has a corps of ignition experts at your service.

SERVICE STATIONS

Albuquerque	Memphis
Augusta	Minneapolis
Birmingham	Nashville
Baltimore	New Orleans
Boston	New York
Charlotte	Omaha
Chicago	Philadelphia
Cincinnati	Pittsburg
Cleveland	Portland, Me.
Dallas	Portland, Ore.
Denver	Rochester
Detroit	San Antonio
El Paso	San Francisco
Houston	St. Louis
Indianapolis	Seattle
Jack. onville	Spokane
Kansas City	Syracuse
Los Angeles	Utica
Louisville	Washington, D. C.

IN CANADA ADDRESS

Russell Motor Car Company at Montreal, Toronto, Winnipeg, Hamilton, Calgary, Vancouver and Melbourne, Australia.

Others Being Established

Why bother with old and unsatisfactory ignition? Why pay repair bills on your magneto when you can get a brand new Remy Magneto, efficient under all conditions, for less?

You can help bring the old car back to its former efficiency.

You can have in new and improved form the magneto that has helped win the world's greatest races; that is standing up year after year under the "gaff" of daily service on over 250,000 cars. The new

Remy Magneto

is lighter in weight, smaller in size and fully 50 per cent. more efficient electrically. The product of the best brains engaged in ignition designing, it is the highest development of the Inductor Type, the key to the great Remy success.

Instead of miles of wound wire revolving in limited space, making insulation almost impossible; instead of wiping contacts, delicate springs and frail brushes and rings, this machine has laminated steel inductors revolving around a stationary winding. As simple as a monkey wrench! Just as efficient at slow speed as at 70 miles per hour. Starts on a quarter turn.

Every Motorist Should Read This Money-Saving Proposition

The simplicity of Remy Magneto construction, coupled with unequaled buying and manufacturing facilities enables the World's Largest Magneto Manufacturers to make you this remarkable offer:

	List Price	Allowance	Net to You
2-Cylinder Remy Magneto with coil—complete	\$46.00	\$9.20	\$36.80
4-Cylinder Remy Magneto with coil—complete	50.00	10.00	40.00
6-Cylinder Remy Magneto with coil—complete	52.00	10.40	41.60

Allowance is for old equipment (regardless of make) that you are now using.

Write, phone or call on nearest Remy Branch or "Remy Service Station" for full information. Ask for the "Mirror Booklet," if you want the "how and why" of the magneto in plain English.

Remy Electric Company

FACTORIES—ANDERSON, INDIANA—GEN'L OFFICES



NEW YORK
BOSTON

DETROIT

BRANCHES

CHICAGO

KANSAS CITY

SAN FRANCISCO

INDIANAPOLIS





LOOK FOR THE NAME
ATLAS
CAST IN
THE TOP

**ATLAS
AUTO
PUMP**

Made by Bridgeport Brass Co.

Inflates Tires Quickly

It's an easy job with an ATLAS because this is the most powerful of all pumps. No wasted effort, no back-breaking work—nothing to do but give the plunger a few strokes and the tire is inflated.

ATLAS is made of the finest seamless brass tubing. An open-top, compound pump. Has no complicated parts, no intricate valve mechanism. Hence there is nothing to get out of order. The joints won't leak and the heavy cast base makes the ATLAS strong and sturdy. It will give long, hard service.

No other pump like the ATLAS. It's false economy to buy an ordinary pump **WITHOUT NAME OR REPUTATION**. We trade-mark the ATLAS because we stand back of it. Don't accept the imitation. Look for the name ATLAS on the pump you buy—the name is **STAMPED IN THE TOP**—and don't forget. This pump is fitted with specially treated and hardened buckets which are practically indestructible. All parts are easily accessible. You can take the pump apart by simply unscrewing two nuts at top of casting.

Know Your Air Pressure

There's an accurate **PRESSURE GAUGE** furnished with the ATLAS—if you want it. Guaranteed to register air pressure within 3%. Better get the **PRESSURE GAUGE** because accurate knowledge regarding pressure makes tires last longer. Send for Free tire pressure table. Tells just how much air your tires should carry.

If your dealer doesn't carry the ATLAS, we send it prepaid on receipt of price.

Price, without gauge, \$4.00

Price, with gauge, \$6.00

BRIDGEPORT BRASS COMPANY

P. O. Station D

Bridgeport, Conn.



*Tire-by
Satisfied
thank you*



**UNQUESTIONABLY—
there is a big advantage
in a dealer being able to
say to his customers—**

I am going to sell, this year, tires made as no other tires in the world are made and they will cost you no more than you are asked to pay for other kinds.

I have arranged with four of the world's leading tire factories to build me a tire for your use that actually combines every element of strength and every secret of manufacture known to the four factories.

In these four immense, completely equipped plants there are at work for me today four corps of tire specialists each of which formerly made a brand of tires which ranked among the world's best tires—Continental, G & J, Hartford and Morgan & Wright.

These experts have combined all their skill, all their knowledge, all their tire building experience to produce one uniformly superior brand of tires—UNITED STATES TIRES, in every one of which there is the Strength of Four.

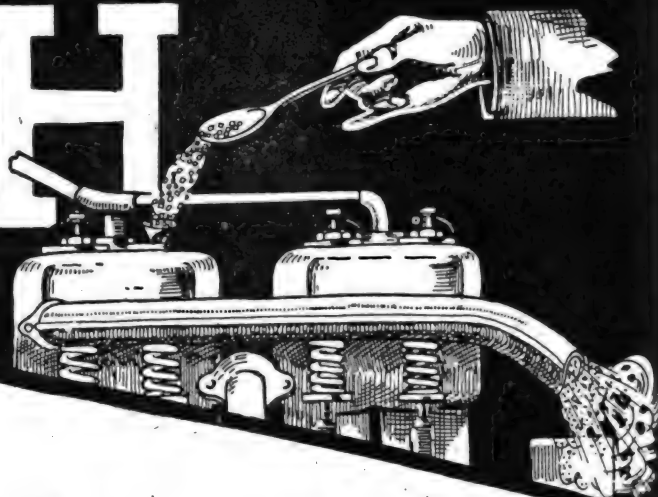
The United States Tire line is a big one. It includes the three most popular and reliable styles of fastening—Quick Detachable, Dunlop (straight side) and Clincher—and four styles of tread.

These are the tires I am handling this season.
Why not try them?

UNITED STATES TIRE COMPANY
New York

FLASH

Decarbonizer



Samples Mailed Free With Literature Upon Request.

**Right Now Is the Time
to Get Your Motor Ready for a
May-Day Ramble**

FLASH Decarbonizer for removing CARBON from Cylinders, Valves, Piston Rings and Spark Plugs without dismantling the motor or laying up the car.

The Process Is Simple—The Result Is Guaranteed—Read:

Remove spark plug and apply about a tablespoonful of **FLASH** through the spark plug hole—replace plug and start the motor running. A few minutes is sufficient, and what a difference!—clean-as-a-whistle, carbon gone-a-flying through the exhaust, and even your spark plugs are cleaned. If cylinders are badly decarbonized repeat once or twice as may be required, keeping the motor in service during the whole operation.

ABSOLUTELY HARMLESS TO THE MOTOR

FLASH is a dry powder, which, when brought into contact with heat, explodes the carbon in minute particles as fine as dust, and ejects it through the exhaust, leaving everything clean. The vapor arising removes the soot and prevents carbon formation. You should always carry a can in your car, use it anywhere any time; also good for motorcycles and motor boats.

Is it worth a dollar a can to you?

How much would it cost to have YOUR motor dismantled and scraped—the old way?

As an experiment, and for your own satisfaction, try a can of **FLASH** worth ten times its cost. It will clean the motor several times.

Sold by supply houses generally throughout the world, or by mail, postpaid, \$1.00.

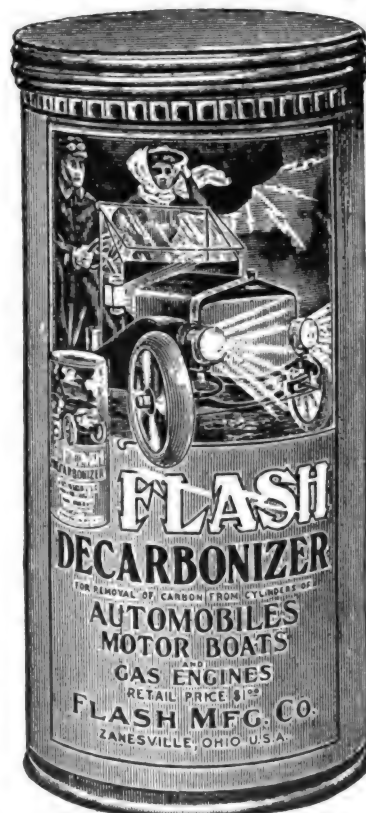
Write for descriptive literature and trade terms.

Don't assume that your territory has been taken—write today.

THE FLASH MFG. CO.

21 Main St.

ZANESVILLE, OHIO, U. S. A.



Order

THE FLASH MFG. CO.,
Zanesville, Ohio:

Please send me One can FLASH DECARBONIZER, charges prepaid to my address. Enclosed find \$1.00 in payment for same.

Sold under guarantee.

A mountain of Evidence

35,600 Replies!

We sent out cards to an ordinary mailing list. We wanted to get from motorists generally—*irrespective* of what tire any one of them might be using—their frank, *uninfluenced* opinion of tires, based on their personal experiences. We received **35,600** replies. 15,300 reported Goodrich

Tires used. Balance divided among users of eleven other makes.

These reports proved conclusively that users average $51\frac{1}{2}\%$ more mileage than is guaranteed from

GOODRICH TIRES

and that an average of one-fifth of Goodrich Tire users never have a puncture or blowout in a *full* season's run.

Six hundred users of other tires complained about tread separating from body of tire—not a *single* Goodrich complaint of this order.

80% of these 35,600 reported that they specify "Goodrich" when new tires are needed. A frequent statement was "I am using Goodrich Tires to replace tires which came on car."

The great bulk of Goodrich Tires are sold to fill a *personal* demand from *experienced* tire users. It is needless for you to experiment when you can profit by what other motorists have learned.

"Nine prophets and a host of truly wise ones"

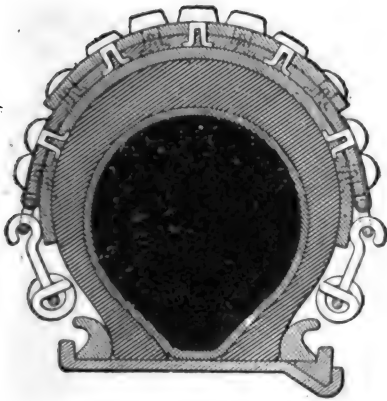
—our book about these reports—puts in your hands the comparative tire experiences of 35,600 car owners; users of *twelve* different makes of tires. It contains no technical claims, no talking points, no "rhetorical bonfires"; but *EVIDENCE* from those alone entitled to give it—tire users themselves.

Write for this book; it will be mailed to you gratis.

THE B. F. GOODRICH COMPANY, - - - Akron, Ohio
BRANCHES AND TIRE DEPOTS EVERYWHERE

Please mention the Automobile Dealer and Repairer when writing to advertisers.

The A. S. B. Triple Leather Tire Protector.



THE A. S. B. Treads are made of 3 thicknesses of leather from the best imported hides. It is Chrome Tanned in the U. S. and is guaranteed to us. It is ten times tougher than rubber. A ten-penny nail will bend before it will go through it. It is next to impossible to puncture it. Our leather is waterproofed. It will not get hard nor crack after being exposed to water or snow. These Treads are all full-steel-studded, with hard steel studs in the center. The side rivets are of a softer steel to better prevent skidding.

Our Treads are self-adjusting, as our springs on the sides of the Tread are made of No. 10 gauge steel wire of the very best and are $\frac{5}{8}$ of an inch in diameter. This makes a perfect, strong spring and keeps the Tread tight on the tire at all times. The springs are much nearer the center of the wheel than the face of the Tread. This gives them greater

leverage, or rather tension, and is bound to keep them tight. These springs never lose their spring quality as they are made of the right diameter—for a No. 10 gauge premier steel wire. They allow flexibility. That relieves the tires of practically all side strain and eventually prevents blow-outs, for the side strain is what wears and breaks the side-walls of the casing and causes blow-outs. These springs keep the Tread on straight and tight. They do not slip and crawl on the tire and destroy the power of your car at times when your power is most needed. We feel safe in saying the A. S. B. Treads are the only self-adjusting non-creep Treads made.

Our Guarantee! We guarantee the A. S. B. Treads to not heat, chafe, rot or injure your tires in any way. If they are not everything we claim them to be, you can return them at the end of 10 days' trial and we will refund your money. The A. S. B. Treads are not an experiment. They have been tested out for the past two seasons. They are giving universal satisfaction and are doing the business. As they do not slip and crawl on the tire we are safe in backing up every A. S. B. Tread that leaves our works with the above Guarantee.

They will more than double the life of your tires and will do away with at least 95 per cent of your tire troubles and that means cutting your tire up-keep expense to a minimum. We Guarantee 4000 miles wear without puncture. Some of the drivers abuse their Treads the same as they would their tires and we are obliged to place the mileage that low, but with decent usage under ordinary conditions they will give from 8 to 10 thousand miles wear. That depends entirely on the condition of the roads traveled and on the manner in which the driver handles the car.

The side-openings prevent the sides from puckering or pocketing. They will not pick up dirt nor sand. They aid in cooling the tire. By an actual test it was proved that tires equipped with A. S. B. Treads run several degrees cooler than the naked tires.

We want an Agency in every town in the U. S. If there is no Agent in your territory, we will make you a Special Price on a full set of four in order to get them on a car where all the Car Owners can see just what we they are. The Treads will get the Repeat Orders, and that is what we are after.

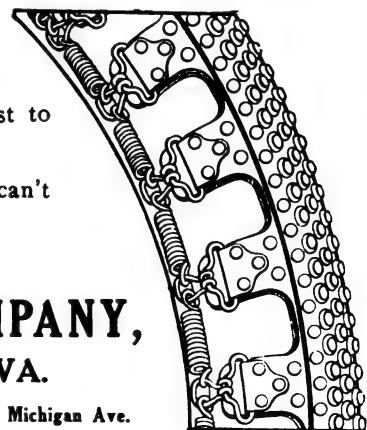
If you are tired of paying excessive tire bills, it will be to your interest to write us for prices, terms, etc.

If you are a Dealer, we have a proposition to offer you that you can't afford to pass up.

Our References—Any Bank in our City.

Factory Address **QUEEN MANUFACTURING COMPANY,**
Lock Box 224, WEBSTER CITY, IOWA.

Agencies—Dallas, Texas, c/o Box 616. Cincinnati, Ohio, 77 Perin Bldg. Chicago Branch, 1346 Michigan Ave.
Address all B. & L. Castor Front Automobile Axle enquiries to our Chicago Office.



The incomparable 400 Blower, the one greatest Helldoom that will be handed down from one Generation to the other. Ask what the owners say.

The 400 Steel Blower will serve the youngest mechanic faithfully without expense for a long lifetime.



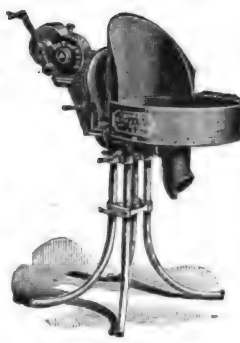
Crank turns either way.

The Famous 400 Champion Steel Blower



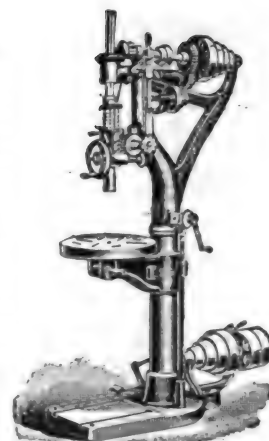
No. 408 Steel Blacksmith's Forge

Over one half million 400 Champion Steel Blowers and Steel Forges in use. Forever run easy, smooth and noiseless.



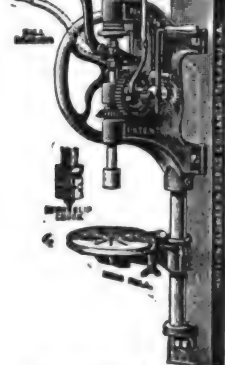
No. 401 Steel Rivet Forge

20-inch Double Back Geared Upright Power Drill is furnished with three complete feeds and is suitably adapted for machine shop and garage use. If you are in need of a power or hand driven Drill write us for full information concerning our complete line.



20-inch Drill

Champion "Patented" Automatic Self-Feed and Lever-Feed Upright Post Drills.



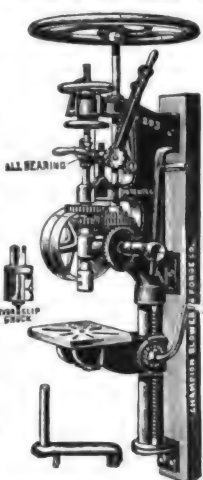
No. 200 Lever-Feed Drill

Made with Ball Bearings only. With the Lever or Automatic Self-Feed 95 per cent in Time and Labor is Saved by the Instantaneous Raising of the Drill Bit out of the hole just bored and again replacing the drill bit back on the material ready to bore the next hole.

Remember—There is NO TURNING BACK of the Screw NUT with EITHER FEED. All the Leading Dealers Carry a Stock of

CHAMPION GOODS.

The Champion Blower & Forge Co. Lancaster, Pa., U. S. A.



No. 203 Self-Feed and Double Compound Lever-Feed Drill



No. 440 Electric Forge

Before purchasing a Hand Blower, Forge, Drill Press, Tire Bender, Tire Shrinker, Screw Plate, Power Blower or Electric Blower, write for our free catalogue, which always shows the greatest variety of improved blacksmith tools built under one control in the world.



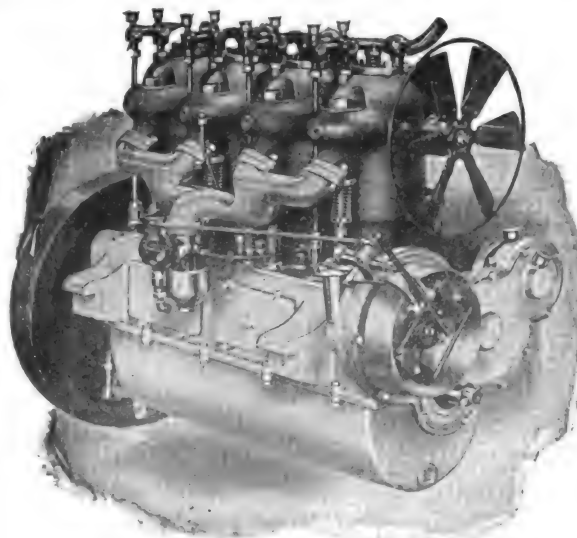
No. 1 Electric Blower

No. 1. One Fire Variable Speed Electric Blower for small, medium or large blacksmith fires, furnished complete with Attachment Cord and Plug, ready for operation. This Blower will pay for itself in a very short time by reason of the time and labor saved by its operation.

OUR LINE IS COMPLETE.

WRITE for the following catalogs of the line in which you are interested:

- No. 18.—General construction of all motors from 3½x4½ to 5x6, cone clutches and transmissions.
- No. 20.—30 to 40 H. P. unit power plants with 4 forward speed transmissions and governor.
- No. 21.—22 H. P. unit power plants with 3 forward speed transmissions.
- No. 19.—Wells clutch.
- No. 17.—4 cylinder, marine engines, 12 to 500 H. P.
- No. 16.—4 cylinder, stationary engines, 12 to 500 H. P.
- No. 15.—4 cylinder, stationary engines (suction gas type), 25 to 500 H. P.

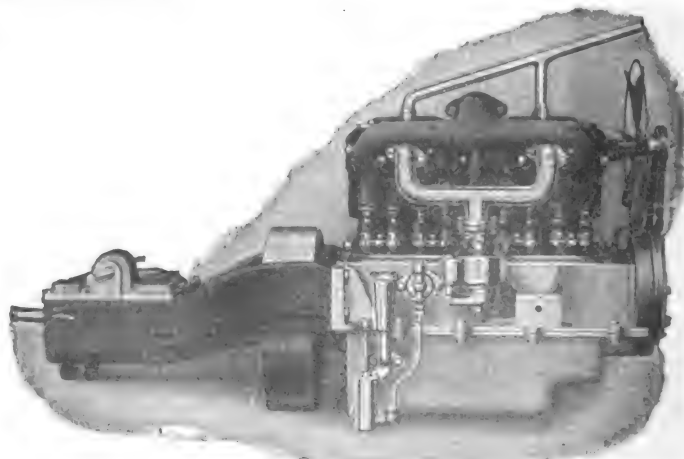


No. 11.—Single cylinder, stationary engines, 2 to 125 H. P.

That we furnish engines for farm tractors, railway locomotives and commercial vehicles of all kinds, is evidence of the range of our work and the stability of our construction.

Model Gas Engine Works

Lock Box 2002, PERU, IND.



That Tire Question

Would soon cease to be so annoying, once you make yourself acquainted with the **Triple Tread** method of eliminating your punctures, preventing your car from skidding, and doubling your tire mileage.



"BEFORE"

The strength and resilience of a tire is in its heavy fabric carcass. Rubber treads are only to furnish a wearing surface to protect this carcass, and to keep out its greatest enemy—water.

Chrome leather, reinforced by steel studs, is the only thing tough enough, water proof and pliable enough to make a better and more economical tire tread than rubber. Chrome leather is ten times tougher than rubber, and water proof.

Three plies of this leather, brought down over the bead of the case so as to prevent rim cutting, and to protect against rut wear—three to six rows of hardened steel studs to give traction and prevent skidding—all this securely **vulcanized** to your casing (old or new) to keep out water and dirt—goes to make up the highest grade of tire efficiency.

The secret of Triple Tread Success lies in the fact that the Triple Tread affords perfect protection to the fabric carcass and positively keeps out all water, which causes rotting. Rubber treads cannot do this—detachable rubber or leather treads cannot do it—inside linings cannot do it. **Nothing but chrome leather, vulcanized to your tires in the Triple Tread way, can do it.**

PUNCTURE PROOF SKID PROOF GUARANTEED

Let us Triple Tread just one of your tires now for a trial. The best time to act is while your car is laid up for the winter. Don't wait till you are ready to take the car out in the Spring.

**Write our nearest factory for full particulars and prices.
EVERY TRIPLE TREAD GUARANTEED FOR 3500 MILES.**

Name

Address

Make of car..... Size of tires.....



"AFTER"

Triple Tread Manufacturing Co.

CHICAGO
1542 Michigan Avenue

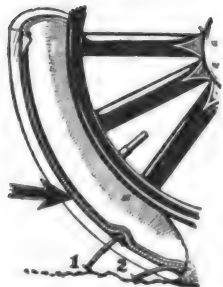
SAN FRANCISCO
542 Van Ness Avenue

WINNIPEG
52 Gertie Street

YOUR TIRES WILL NOT Puncture or Blowout

WHEN LINED WITH "BULLET PROOF" INNER TUBE PROTECTING WEBBING

Every owner finds tire trouble not only the most expensive item in the cost of upkeep but the greatest drawback to the pleasure of motoring as well.



1. Shows webbing taking nail.
2. Turning nail.

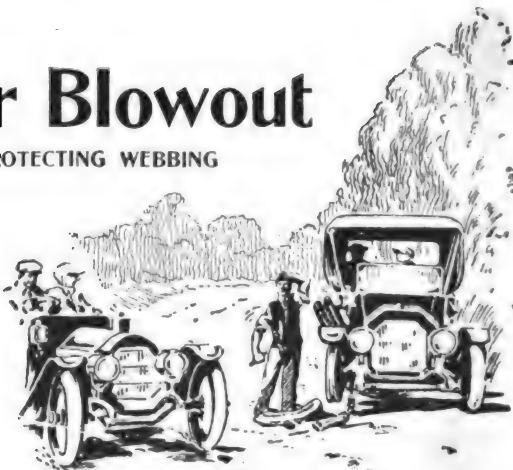
With the advent of "Bullet Proof" Waban Webbing this perpetual expense was overcome—there is no longer any excuse for tire trouble and expense.

"Bullet Proof" is a heavy webbing, simply slipped between the inner tube and casing, and is the sanest and lowest priced article for lengthening the life of tires.

Easily inserted by anyone in a few minutes.

If you are not using "Bullet Proof" you're the loser.

WRITE TODAY FOR BOOKLET AND PRICES



Waban Webbing Co., 207 Essex St., Boston, Mass.

If it's GRAY'S—It's the Best

GRAY'S Newark XXX Reliners

Four to six ply, heavy tire fabric, coated with self-curing cement to prevent creeping, and perfect fitting.

GUARANTEED NOT TO BLOW OUT!!

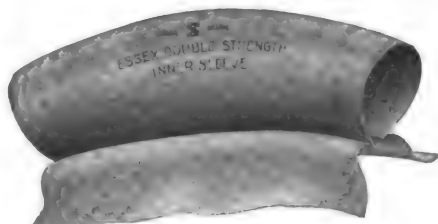
28x3.....	\$3.00	36x3½.....	\$4.40	36x4.....	\$5.50
30x3.....	3.20	30x4.....	4.50	32x4½.....	5.70
32x3.....	3.40	31x4.....	4.60	34x4½.....	5.90
34x3.....	3.60	32x4.....	4.80	36x4½.....	6.00
30x3½.....	3.80	33x4.....	5.00	35x5.....	7.00
32x3½.....	4.00	34x4.....	5.10	36x5.....	7.40
34x3½.....	4.20	35x4.....	5.30	37x5.....	7.50

This is a special introductory offer and goods will be sent prepaid on receipt of price.

GRAY SPECIALTY CO., - 148 Avon Avenue, Newark, N. J.

Reduce Your Tire Expense

ESSEX
Double Strength
Inner Sleeve



RUBBER PYRAMID MATTING
OUTSIDE TIRE BOOTS
RUBBER LAMP CONNECTIONS
RUBBER GOGGLES

By using
The BEST Reinforcements.

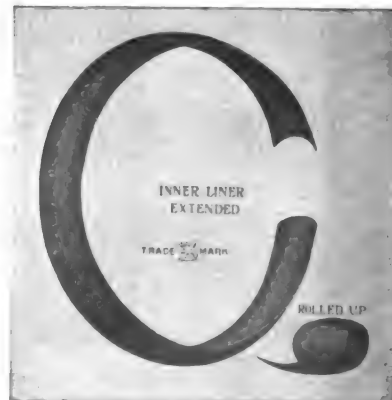
Demand ESSEX Products and secure the highest qualities at a cost no more than you pay for the ordinary kind.

Live Jobbers everywhere carry ESSEX Goods in Stock.

ESSEX RUBBER CO.
TRENTON, N. J.

WRITE FOR SOUVENIR ERASER.

ESSEX STANDARD RELINER

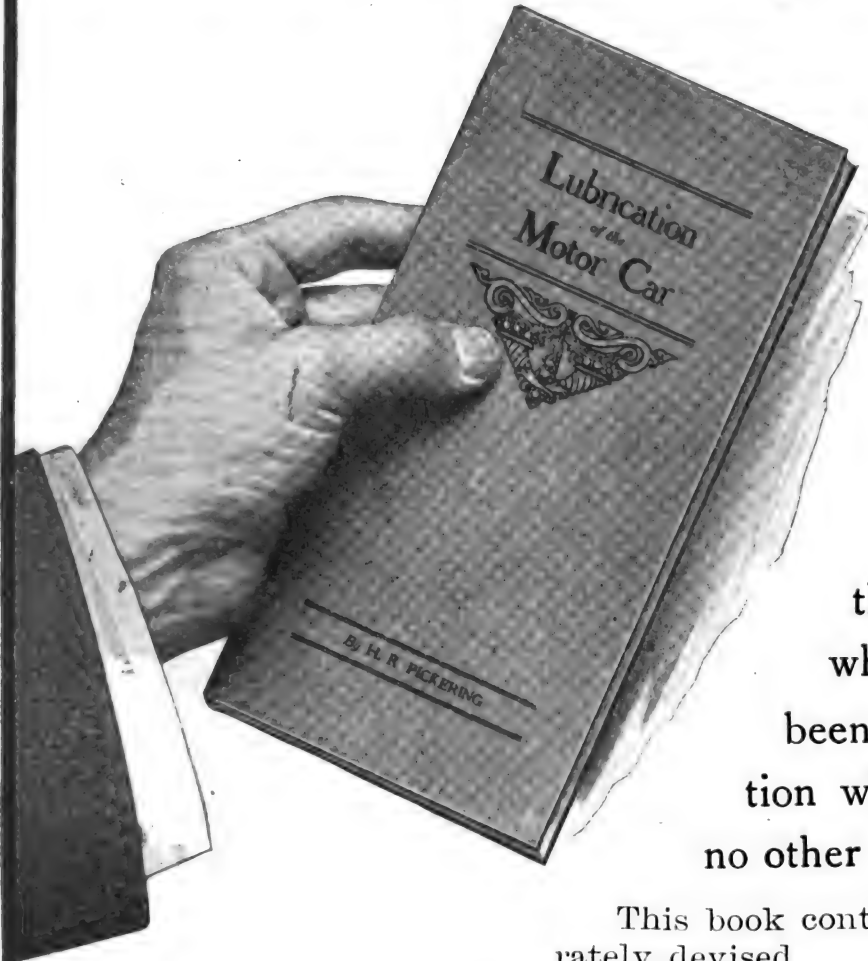


RUBBER SPRING BUMPERS
RUBBER GENERATOR TUBING
ASBESTOS GAS ENGINE PACKING

IF YOUR DEALER DOES NOT CARRY THIS LINE WRITE FOR CATALOGUE AND PRICES, ALSO SEND US HIS NAME.

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Beforehand is the thinking time of wise men



Before you drive
your car another
mile, Mr. Wise
Motorist

Get this Free Book on Lubrication

It contains a fund
of information on
this important subject
which has never before
been published—informa-
tion which you can get in
no other way.

This book contains a complete and accu-
rately devised

LUBRICATING CHART

which points out details of lubrication which you have probably thought-
lessly neglected or misunderstood, to the detriment of your car. Consult
this chart and read the book, before you begin another motoring season.

Send for both today.

Accurate
illustrations

Authentic
information

Simply paste this coupon on
a postal, after filling
out with care.

**New York & New Jersey
Lubricant Co.**

165 Broadway New York

Chicago, 1430 Michigan Ave.
Phila., 1416 Vine St.

Distributors for Pacific Coast—

HUGHSON & MERTON—San Francisco, Los Angeles, Seattle, Portland.



Please send me your book on Lubrication.

Name _____
Address _____
Dealer _____
Address _____
Car _____

A. D. & R. I.

Do You Want a Crank Case Explosion?



A great many motors have been destroyed from this cause and so may yours be, if the cylinders have worn large. It is easy enough to forestall the damage and save yourself not only the expense but the obvious danger.

Examine your automobile cylinders in time and if they show wear take them down and send them to us to be rebored.

A car doesn't have to run a million miles before the natural wear causes the cylinders to become larger in diameter, thus allowing the charge to get past the pistons and into the crank case. A spark or a piece of red-hot carbon will ignite the mixture and a crank case explosion blows your motor into fragments. **Before** this happens let us rebore the cylinders. We have special machines for the work and do the reboring as if the cylinders were in their natural working position. We make the bore true, accurate and smooth. New pistons and rings are carefully fitted and our whole process is carried through with the utmost precision and attention to every detail. We guarantee our workmanship to be first-class and you obtain from us all that is possible in mechanical experience and skill.

Don't wait. Send your cylinders NOW.

Eliminate the danger, and at the same time our work will restore to your motor full power and efficiency.

H. B. UNDERWOOD & CO.

1019 Hamilton Street,
PHILADELPHIA, - PA.

If it were possible to make a better oil than Panhard we'd do it.

But it isn't. With 35 years' experience behind us, we know it to be the highest quality that can be produced.

Remember this when you decide the question of oil for your car this season. You can't afford to take chances.



Is refined from the best oil in the world—Pennsylvania crude. It is absolutely uniform in quality. It is filtered just enough to give it lightness of color and freedom from carbon, but not enough to destroy its lubricating body. It keeps its body at high temperatures. It will not carbonize, unless fed too freely.

Look for the checkerboard mark on every Panhard Oil package, both cans and barrels. It is your protection and insures your getting the high quality which every automobile engine needs.

Our 1912 booklet, "Motor Lubrication," contains valuable information as to the lubrication and care of an engine. Sent promptly in return for your dealer's name.

George A. Haws

67 Pine Street New York City

Dealers: We have a special "Help Sell" plan that will interest you.

Principal Distributing Points:

Boston; Chicago; San Francisco; Omaha;
Columbus, Ohio; Minneapolis; Dallas; Los Angeles;
Shreveport; Portland, Ore.

Character in Speedometers

THE 1912
MODELS OF

The Star Speedometer



MODEL A-5. Price \$15.00

are instruments of mechanical beauty and completeness. They sustain and enhance the character and reputation built up by these accurate and steady-hand instruments during the past five years. They will be found to be very complete and reliable instruments for indicating speed of automobiles and motor vehicles of all kinds. With the Odometer in connection the driver of a car is posted at all times as to the speed and distance traveled.

Star Speedometers are a development of the highest mechanical order and their entire make-up is sure to please the most fastidious person. They are as reliable as a Corliss engine, are Cheap, Strong and Practical—instruments of Beauty and usefulness.

Steadiness of hand motion, a most important feature in Speedometer construction, is assured in the Star by placing the hand regulating motion under the direct control of a balance wheel securely fastened upon a central or main shaft, with a perfect ball balance similar to the governor of a Corliss engine.

We indicate our faith in Star Speedometers "making good" and proving superior to any as reliable and steady-hand instruments, by sending them on trial for 30 days absolutely free. This plan of putting Speedometers on the market might be disastrous to some makes, but has been the means of selling hundreds of Stars to patrons who sought the best regardless of price.

We claim the Star is the equal of any instrument costing from two to four times as much. You can verify our claims without cost, and show yourself on your own machine what the Star will do.

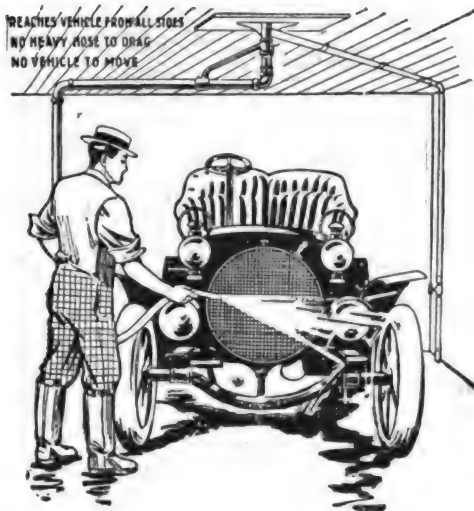
Prices range from a 50-mile instrument at \$15.00 to a 100-mile Twin Combination with electric light attachment at \$110.00.

All reliable dealers handle them.

Our 40-page Illustrated Catalogue Sent Upon Request.

THE STAR SPEEDOMETER CO., Milton, Pa.

The Western Buggy Washer



IN OPERATION

It saves time, labor and money. It keeps the hose off the floor.
It drains both ways. It is made of malleable and wrought iron.
It is sold on honor and guaranteed.

THEREFORE, your hose keeps dry and never wears out. No kinks.
No freezing. No breaks. Works easily and smoothly.

SPECIAL SALE Price \$8.00

We will ship you one of our Overhead Washers on 30 days
trial, if not satisfactory to be returned at our expense.

Manufactured under our own patents and guaranteed by us.

The Western Robe Mills

24-26 PECK COURT

CHICAGO, ILL.

A PERFECT OUTSIDE AND INSIDE EMERGENCY PATCH



**GUARANTEED
TO SATISFY
YOU OR IT
COSTS YOU
NOTHING.**

Relieves the
longest trip of all
apprehension
of danger.

Jno. Y. Whiteman, Biggsville, Ill., says:

"I have run my own car almost 11,000 miles, and have never carried
an extra casing one mile, but never go without four Patches. In
fact, I recall one case in which I had a blowout and one of your
Patches brought me home 300 miles, without any trouble."

Standard size, 8-inch, \$2.00, PREPAID to any address.
MONEY BACK IF YOU ARE NOT SATISFIED.
Good proposition to offer LIVE DEALERS.

Write for "TIRE SENSE."

20TH CENTURY TIRE PROTECTOR CO.,

Main Office and Factory, MIDLOTHIAN, TEXAS.

Dallas Office, 411-12 Slaughter Building, Dallas, Texas.

Reliance

(REG. U.S. PAT. OFF.)

Spark Plugs Guaranteed Carbon and Soot Proof

The Reliance Plug has a patented electrical
action that destroys carbon and soot as fast as it is
deposited. Aids in development of maximum power
—uses less current. For air or water cooled motors.

Reliance SPARK PLUG—"Sparks in Water"

Infalible proof that it can't be short circuited.
Porcelain is heat proof. Reliance Magneto
Plugs are specially recommended for oily engines.
Satisfaction guaranteed or your money
back. Sold by dealers everywhere, or sent
prepaid on receipt of price. Get our Famous
Book—"Ignition and Spark Plug Talk"
—a valuable reference book—will make you
master of your ignition system. IT IS FREE.

JEFFERY-DEWITT CO.

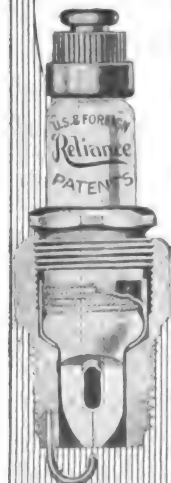
60 Butler Ave.,

DETROIT

New York Branch: 1789 Broadway

Regular
Type
\$1.00

Magneto
Type
\$1.25



ONCE REX—ALWAYS REX



No Garage Complete Without THE REX TRIPLETS.

REX METAL CREAM

For polishing lamps, radiators, tanks, etc. Reproduces the original
lustre—not merely a "white shine." Does not settle solid, and will
polish twice the surface of any other brand.

REX WOOD OIL

For cleaning and polishing automobile bodies, hoods and cushions.
Produces a high lustre and guaranteed to contain no acids, alkalis
or other injurious chemicals. Will not collect dust.

REX LEATHER DRESSING

For refinishing cushions, leather, mohair and pantosote tops on
automobiles, carriages and buggies. Imparts a black durable
waterproof finish. Will not crack or blister and is not affected in
any way by rain or sun. Dries in 10 minutes.

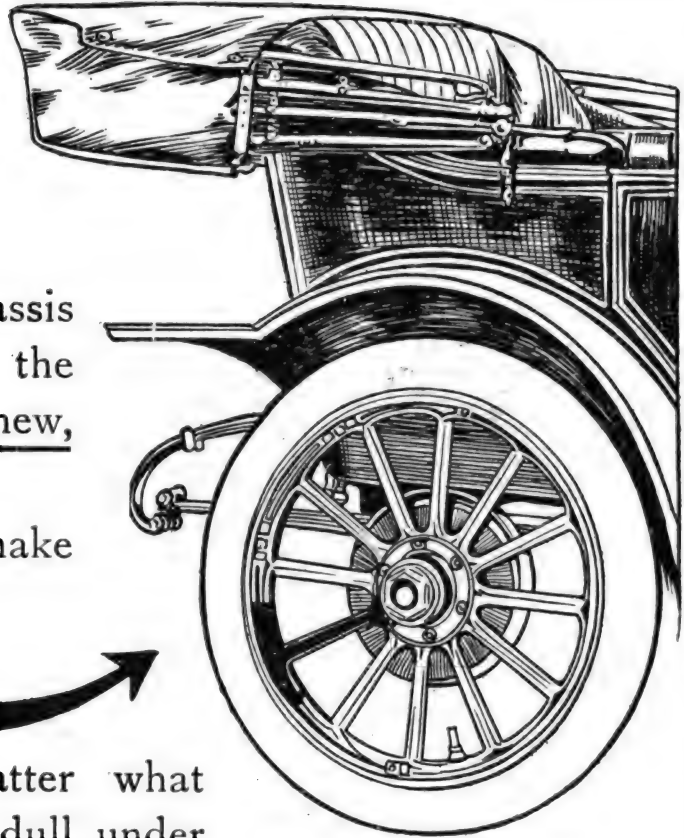
A sample order will convince you.
May we send one?

Armiger Chemical Co.,
2150-52 Austin Ave., Chicago, Ill.

If You Varnished One Spoke

with Valentine's Vanadium Chassis Finishing you might not note the difference when the finish was new,
but

A few weeks' service would make the wheel look like this one.



The other varnish (no matter what kind) would turn cloudy and dull under the hard usage on the road and the soapy water wash down in the garage.

Valentine's Vanadium Chassis Finishing is not affected by soapy water, and retains its original brilliant and unclouded appearance for many months.

If you want the wheels, fenders, hood and all under parts of your car to stay new indefinitely, instead of losing their lustre, have them varnished with

Valentine's Vanadium Chassis Finishing

We have proved this varnish absolutely in years of tests at our factory. We have proved it in public tests at the automobile shows.

Let us prove it to you. We will send you a small varnished demonstration tin. You can watch the ordinary automobile gear varnish turn gray and lose its lustre, while Vanadium Chassis Finishing remains in perfect condition. The demonstration is free, of course.

Sign the coupon for the tin and booklet.

Valentine & Company

456 Fourth Ave., New York 343 S. Dearborn St., Chicago, Ill. 74 Pearl St., Boston

TRADE **VALENTINE'S** MARK
VARNISHES

(U. C. B.)
Name.....
Address.....
State.....
City.....
Cut off and mail to
Valentine &
Company

Please mention the Automobile Dealer and Repairer when writing to advertisers.

Revolving Cases.

OUR NEW CASE.



Square Drawers, from $2\frac{1}{4} \times 3\frac{1}{4} \times 4\frac{1}{4}$ to $5\frac{1}{2} \times 5 \times 13\frac{1}{2}$.

No manufacturer, dealer or repairer of Automobiles should be without our Cases. They occupy but a small space and their capacity is very large. The Drawers are locked in the Case so as to prevent their removal. Every Case guaranteed. Made for Screws, Bolts, and other small articles. Made in various sizes.

Catalog sent on application.

AMERICAN BOLT & SCREW CASE CO.,

Dayton, Ohio.

Your Idea of Enthusiasm Is Limited—

unless you've heard a Ford owner discuss the Hagstrom Spark Plug—"the plug with the porcelain guard."

When you pay \$1.00 for a spark plug you are entitled to a plug of Hagstrom quality. But paying that price seldom gets it.

Your dealer will furnish Hagstrom Plugs—if you insist.

Write to-day for a gas tank key—and for descriptive matter of the improved suction Priming Cup and other Hagstrom specialties, to



The Hagstrom Bros. Mfg. Co.

Dept. D, LINDSBORG, KANSAS.

Or,

LOWE MOTOR SUPPLIES CO., New York City Distributors.

NEWTONE

The Mile Away Electric MOTOR HORN



Torpedo Type

Pat. Sept. 8, 1911

PRICE

\$20.00

Including Button and Cable

The Most Perfect Warning Device on the Market

The increased demand for the Newton Motor Horn is due to its absolute efficiency in warning, and economy in operation.

The motor with Hess Bright Ball Bearings and imported self-lubricating brushes, eliminates all oiling and cleaning.

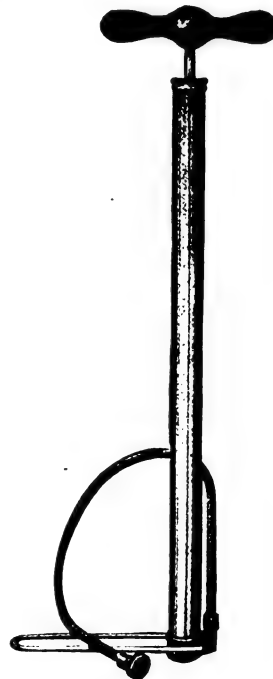
The chief engineers of three leading American automobile manufacturers, after a "Break-down" test, state that, in their opinion, the Newton Horn is the best warning signal made.

LET US SEND ONE ON APPROVAL

Automobile Supply Mfg. Co.

220 Taaffe Place, Near DeKalb Ave., Brooklyn, N.Y.

Pitner Pump



This is the easiest working, longest stroke, most efficient hand pump for tires, and is the only one guaranteed for 5 years' service.

You lose no time in attaching the hose to the tire valve—no cranky threads to bother with. Just jam on. Pump as hard and as fast as you like, no jar to you or the pump. The air cushion prevents striking bottom.

The all-metal air tight piston and 14 gauge seamless brass barrel are other exclusive features of the Pitner Pump.

If your dealer can't supply you send us his name and \$5, and Pitner Pump will be sent express prepaid. Money back if you are not entirely satisfied.

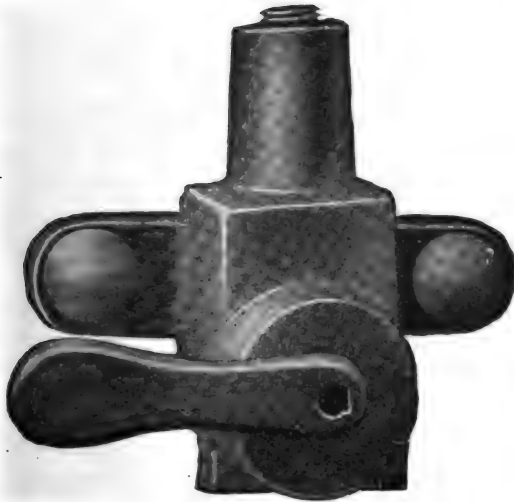
PITNER PUMP CO.

1214 South Michigan Avenue

CHICAGO, ILL.

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THE AUTO-LOCK



Operates valve on gasoline tank from outside of car and successfully works out three principles:

Prevents theft.

Safeguard against fire in garage or on the road.

Prevents evaporation of gasoline, which alone will save the price of lock in a short time.


Representatives wanted in unoccupied territory.

Send for Circular and Prices.

THE GLOBE AUTO LOCK CO., Manufacturers,
Canisteo, N. Y.

Superior Drop-forgings



There's service in the  trade-marked products and you should have it.

This company originated and developed the means for the best possible care of Nut and Cap Screw-moving conditions and in the selection of "Big-Six" set assure you maximum service in least number of wrenches—capacity for all principal bolts and screws from $\frac{1}{4}$ to 1 inch; for every nut and screw about the chassis or engine.

Circular No. 117 is an interesting one to dealers and owners and a postal card will secure it.

See your dealer or communicate directly if must.

J. H. WILLIAMS & CO.

Superior Drop-Forgings

17 RICHARDS ST., BROOKLYN, N. Y.



Make Your Auto-
Top Look Like New—Use

Felton-Sibley "EVERNEW"
AUTO-TOP
DRESSING

IT'S the best way to brighten it. Easily applied with ordinary paint brush in a few minutes. Water-proof, weather-proof, dries quickly, will not crack, can't injure the finest top. A fine-appearing, new-looking auto-top adds wonderfully to any car—"EVERNEW" Auto-Top Dressing will keep yours that way all the time. Comes in 8 standard colors—special shades to order. Send for color card and prices.

FELTON, SIBLEY & CO., Inc.

Mfrs. Colors, Paints, Varnishes

136-140 N. Fourth St.

PHILADELPHIA, PA.

"Evernew" Auto-Top Sizing for first coat on mohair, cloth or canvas tops that have never been painted.

"Evernew" Auto-Body Enamel in colors to correspond with "Evernew" Auto-Top Dressing.

11

Please mention the Automobile Dealer and Repairer when writing to advertisers.

HERE'S THE REMEDY FOR A LEAKY RADIATOR.



Takes ten to fifteen minutes,
and no soldering.

Non-injurious.

SE-MENT-OL

CHEMICALLY CORRECT

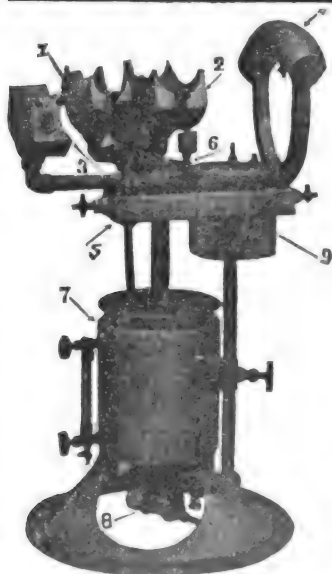
Simple as
A-B-C.

Remove cap and
pour in Se-ment-ol,
run engine ten minutes.
That's all.

Ask an up-to-date supply or repair man,
or write to

The Northwestern Chemical Co
Marietta, Ohio.

The "Master" M.A.C. STEAM VULCANIZER 4 TIRES at ONE TIME



We have tire repair
plants that fill the require-
ments and fit the pocket of
Every Buyer.

For the garage, the
Master at \$100.00.

For the exclusive tire re-
pair shop, the models run
from \$100.00 to \$500.00.

We have them as low as
\$25.00.

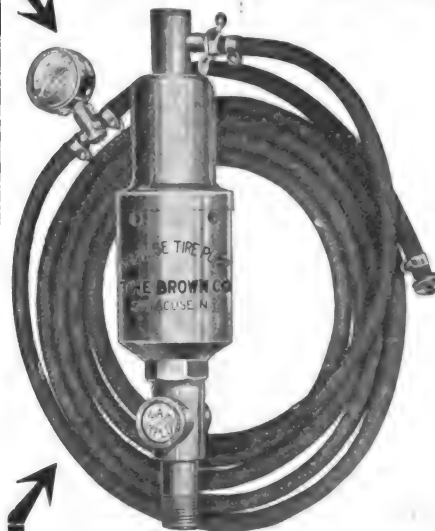
Write for catalog.

HAYWOOD TIRE & EQUIPMENT CO. 528 N. CAPITOL
INDIANAPOLIS IND.

LET YOUR MOTOR INFLATE YOUR TIRES

It's not necessary for you to break your back and
spoil your temper trying to inflate your tires with an old-
fashioned hand pump.

GET A BROWN IMPULSE TIRE PUMP



and let your motor
do the work. It
takes but a moment
to move the most
convenient spark
plug and screw in
the Brown Impulse
Pump. No tools
are necessary.

One to four
minutes inflates
with pure, cool air
to any pressure up
to 150 lbs.

No complicated
parts, nothing to
wear or get out of
order.

Will last a lifetime.

Enjoy your car
this year. The
Brown Impulse
Tire Pump removes

the most disagreeable feature of automobiling. Price
\$15.00, including 12 feet of hose, HIGH GRADE RE-
CORDING GAUGE and SELF OPENING VALVE
CONNECTION.

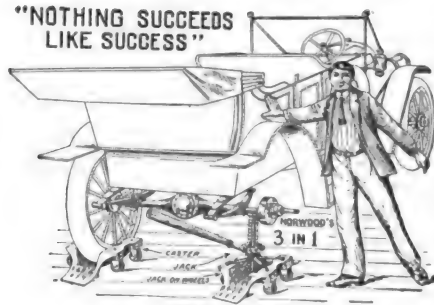
An essential part of your 1912 Equipment.

Ask your dealer or write us for full information.

The Brown Company, 1100 S. Clinton St., Syracuse, N. Y.

NORWOOD'S 3 IN 1

"NOTHING SUCCEEDS
LIKE SUCCESS"



CASTER or port-
able turn-table,
JACK, and JACK-
ON-WHEELS

ANSWERS THREE
PURPOSES.

A set of casters is a
necessity in every
garage, shop and
factory.

You must have a Jack.

You cannot afford to
be without a Jack-on-
Wheels.

The Best, Simplest, Lightest, Smallest and Most Satisfactory Device for
Handling Automobiles, Trucks, Etc., That Has Ever Been Introduced.

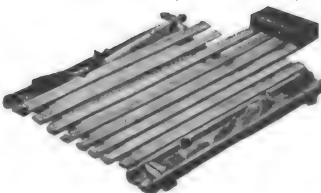


Licensed Under Weber Patent.
Patented June 25, 1907—Oct. 25, 1910

BECAUSE—They are better de-
signed. Mechanically correct.
Frame one solid piece of Malle-
able iron. Cars can be run on
or off either end. Ball-Bearing
Casters with large wheels
respond with less effort.

Write for our 30 day Free
Trial Offer.

IDEAL AUTO TRAY



Thirty-seven inches long,
22 inches in width,
3 inches from floor, on 4
Roller Bearing Casters.

DISCOUNT TO THE TRADE.
AUTOMOBILE & ACCESSORIES MFG. CO.
BALTIMORE, MD.

CHILD KILLED BY AUTO AS SISTER WATCHES HER FROM HOME

MORE WILD AUTOS AT LARGE IN CITY

MORE AUTO VICTIMS; TWO NEAR DEATH

THREE ACTRESSES HURT IN AUTO WRECK

TWO AUTOS WITH NINE PASSENGERS COLLIDE

CAR UPSETS AUTO; FIVE WOMEN HURT

TRAIN HITS AUTO FULL OF WOMEN AND CHILDREN; 3 DEAD, 2 DYING

AUTOMOBILE DRAGS A GIRL TO DEATH

DR. R. T. CUT IN BY A FLYING AUTOMOBILE

Avoid Dangerous Collisions!

Hundreds of persons are killed or injured, and thousands of dollars wasted on repairs every year by automobile collisions that are due to inability of ordinary brake linings to stop cars quickly in emergencies. Accounts of serious collisions, such as are here shown, can be found in the newspapers almost daily.

Could you depend on your brake lining to stop your car quickly if danger suddenly loomed up only a few feet ahead?

No matter how fast you speed, you are always absolutely safe in relying on the brakes to lock the wheels of your car almost instantly, if lined with

J-M NON-BURN BRAKE LINING

This lining is made of Asbestos, reinforced with fine brass wires, which means a mineral lining against a metal drum—the greatest braking efficiency known.

Yet, with a slight pressure on the brakes, this lining will stop a machine as slowly as desired.

Tests also show that J-M Non-Burn outwears at least twelve ordinary linings. Frictional heat cannot burn or char it; oil, gasoline or water cannot affect it.

Insist on seeing the name "J-M Non-Burn" on your lining. Don't take chances with cheap substitutes. Sold by all first-class dealers.

A copy of the autoist's hand book "Practical Pointers on the Care of Brakes" sent on request. Write our nearest House.

H. W. JOHNS-MANVILLE CO.

Baltimore	Chicago	Detroit	Los Angeles	New Orleans	Philadelphia
Boston	Cleveland	Indianapolis	Milwaukee	New York	Pittsburgh
Buffalo	Dallas	Kansas City	Minneapolis	Omaha	San Francisco
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ADJUSTED IN 4 SECONDS WITHOUT A WRENCH

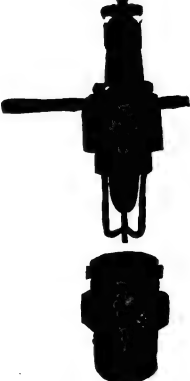
The "E. Z." is altogether the most satisfactory spark plug manufactured for

**AUTOMOBILES
MOTOR TRUCKS
MOTOR BOATS MOTOR CYCLES**

Positively holds full compression; can be locked to 2000 pounds pressure by a mere twist of the hand. There is only one "E. Z." spark plug. Insist upon your dealer selling it to you, or write

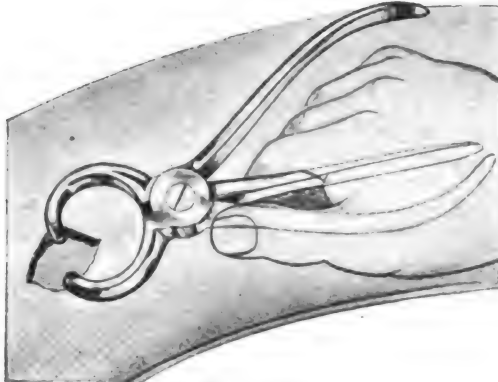
THE AUTOPARTS MFG. CO.
C-810 West Side Ave., JERSEY CITY, N. J.

The Sign of a Good Spark Plug and a "Live" Dealer



PRICES:

Complete Plug,	\$1.25
Interchangeable Core,	.75
Core Socket,	.50



Patented.

A booklet, "Cutting Out Tire Expense." One printed for YOU. It's free—No postage.

Were GILMER TIRE REPAIR PLIERS *included in the equipment of your car* when you bought it? If not, ask your dealer for them, or send me his name and \$1.00, and get a pair by return mail. My guarantee is—**Satisfaction or money refunded.**

OWNERS—Repair the Cuts.

VULCANIZERS—Don't vulcanize a hole full of dirt, get GILMER TIRE REPAIR PLIERS and do a *good* job.

DEALERS—Each of your customers will *sell himself* a pair when he sees them.

G. WALKER GILMER, JR.,
MANUFACTURER,
52 No. 7th Street, Philadelphia, Pa.

P. S.—Sample of self-vulcanizing gum and cement sent for 25 cents additional.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

**SPECIAL OFFER.**

If you will send us your dealer's name and address, we will send you two sets Auto patches for \$1.00, postpaid.

You will always need patches and we want to prove to you our patches do all we claim.

A FEW REAL FACTS:**SECURITY****Self Vulcanizing Patches**

Are in a class by themselves.

Because, they not only stick, but they Self Vulcanize.

They make a permanent repair.

The more heat from running, the tighter they hold.

They require only gasoline to apply.

JOBBERs—Security Patch sales will show you the right profit on the right side.

Auto Sets, 10 Assorted Sizes, - - \$1.00
Motorcycle Sets, 10 Assorted Sizes, - .50

Write for circular and price List of Security Self Vulcanizing treads. Sold complete, ready to apply.

THE SECURITY CO., 20 Shingiss St., Pittsburgh, Pa.

**Peerless Four-Cylinder Tire Pump**

A Powerful, Compact Air Compressor for Quick Inflating with Little Work.

Having 4 cylinders instead of one and turned by a rotary motion, it far surpasses the straight stroke pump for comfort and speed. It clamps on the running board solidly and permits of turning in either direction.

Handle is removable and fits with Pump and Clamp in the tool box. Crank handle can be used as a clamp fastener also. Guaranteed High Pressure Gauge reading to 150 lbs. Plenty of hose to reach tires. Pump is built like a high-grade four cylinder engine, by expert builders of compressed air machinery, and is guaranteed for five years.

Weight of Pump including all attachments, is nine lbs. Fits on the palm of the hand.

We want to show you how you can pump with a Peerless and perspire less; you'll be interested.

WRITE FOR FOLDER AND BOOKLET

Peerless Accessories Manufacturers, 1926 Wabash Ave., Chicago, Ill.

Agency Proposition to Live Dealers in Every Locality.

**The One Minute Liquid Vulcanizer**

Will enable you to permanently Vulcanize your own Tires and Inner-Tubes in one to ten minutes. No Acid used in the manufacture of U-VULK; No Heat Required; Therefore No Possible Chance of Burning the Tire or Tube.

A FULLY GUARANTEED ROADSIDE REPAIR KIT.

Complete outfit, enough for 50 permanent repairs, \$2.50 prepaid.

Write for descriptive folder to-day.

Live dealers and agents wanted in uncontracted-for territory.

THE GEM CITY LIQUID VULCANIZER CO.,

B. S. ESHLMAN, Gen. Mgr.

1021 E. THIRD STREET, DAYTON, OHIO.

**Baldwin Chain and Mfg. Co.**

makes automobile chains both riveted and detachable—
all sizes in stock.

SPROCKETS

We carry in stock sprockets for the following cars:
Cadillac, Reo, Buick, Brush, and Chase Motor Truck.

Sprockets made to order.

Send for Quotations and Circulars

Baldwin Chain & Mfg. Co.,

Worcester,
Mass.

AGENTS: { Mr. H. V. Greenwood, 150 Michigan Ave., Chicago, Ill.
Mr. C. J. Iven, Rochester, N. Y.
Mr. M. A. Bryce, 788 Mission St., San Francisco, Cal.



Please mention the Automobile Dealer and Repairer when writing to advertisers.

"BEST"



IN THE WORLD

Made and Guaranteed By
QUALITY CEMENT COMPANY, Fernwood, Del. Co., Pa.
HENRY E. EBY, Gen. Mgr.

The Hotter the Weather the Better It Sticks.

RUBBER CEMENT

For repairing Automobile and Bicycle tubes and tires.

This cement will do anything in the way of cementing. It will cement rubber to leather; rubber heels and soles to leather shoes.

Best there is for plugging purposes.

If your dealer does not handle our cement, send us 40 cents in stamps and we will mail you a 1 1/2 x 6 tube; or 90 cents for 1 dozen No. 1 Tubes. Jobbers and Dealers, write for our prices and discounts of Quality Cement.

The Wonderful

HANDY LAMP

Gasoline Lighting System.

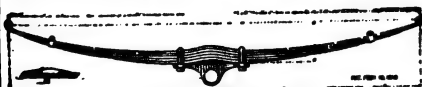
A 300 Candle Power Shadowless Light that can be turned up and down like gas and left burning at a mere glimmer and instantly turned up when more light is needed.

Equal for any purpose to a private gas plant entirely under your own control; so simple any one can operate. Better than gas, kerosene or electricity at half the cost. We have five other distinct lines of gasoline lamps and hollow wire systems; every one a success and winner.

Catalog A. D. R. tells why. Write for it now. Be our agent and decide which line you want to use.

Brilliant Gas Lamp Co.,
Dept. 28,
No. 182 N. State St., Chicago, Ill.

TITANIC SPRINGS



Suitable to all makes and models of cars. They go on any car like any other spring. Guaranteed absolutely. If broken for any reason will replace at any time, and no questions asked.

No center hole—the curved center and retaining plate hold the spring positively.
No breakage—no hole to break in.
Has already been tested on 3000 cars.

TUTHILL SPRING CO., 758 Park St., Chicago.

Automatic in Action SAGER SHOCK ABSORBERS

Have proven for seven years to be mechanically correct
Prevent recoil and bumping of springs; thereby reducing car maintenance to a minimum.

60 DAYS FREE TRIAL

ONE YEAR GUARANTEE

Regular equipment on Saurer, Kissel Kar, Lippard-Stewart and Franklin Trucks

ENDORSED BY THESE PROMINENT MANUFACTURERS

OLDSMOBILE
"The 'Sager Device' presents advantages not found in other so-called 'shock absorbers.'"
Olds Motor Works.

ELMORE
"We are entirely satisfied with them."
Elmore Mfg. Co.

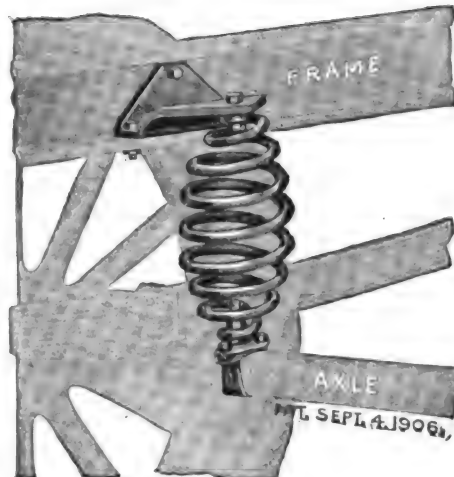
PIERCE-ARROW
"They make Pierce Cars ride like a cushion."
S. K. Pierson.

CRAWFORD
"They add greatly to comfort and reliability."
Crawford Automobile Co.

LOGAN
"We find them indispensable."
Logan Construction Co.

DORRIS
"Our customers are more than satisfied with them."
Dorris Motor Car Co.

RAMBLER
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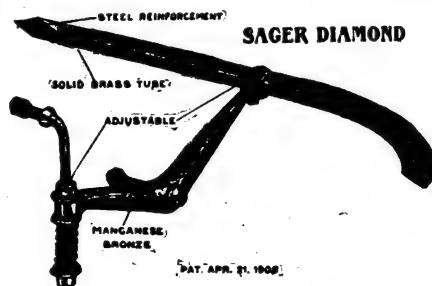
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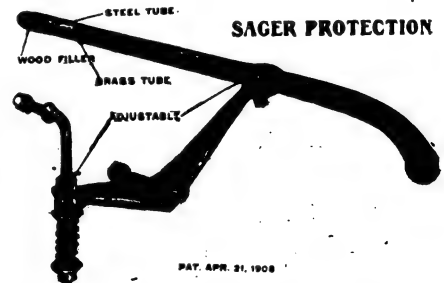
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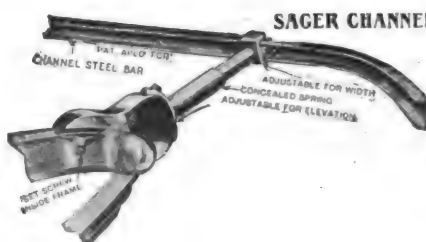


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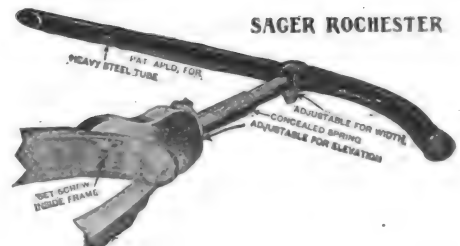


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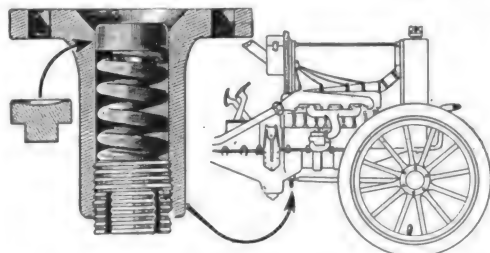
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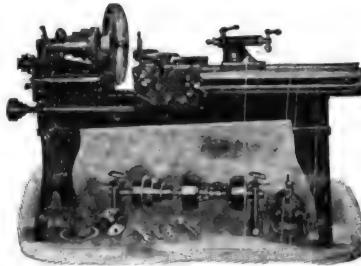
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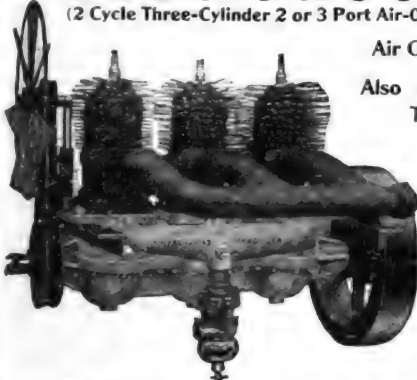
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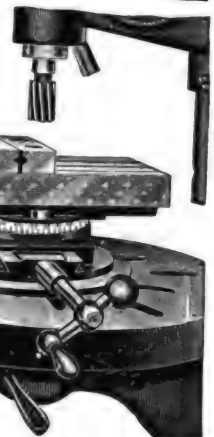
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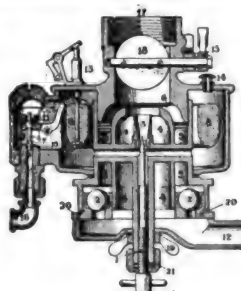
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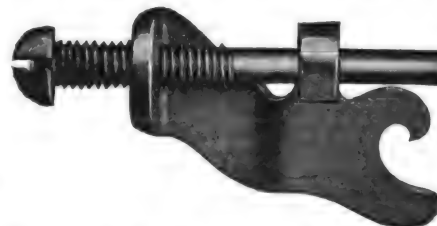
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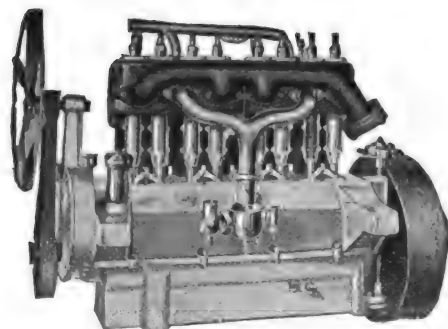
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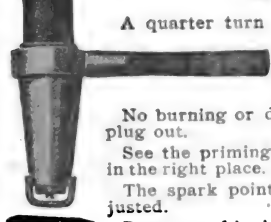
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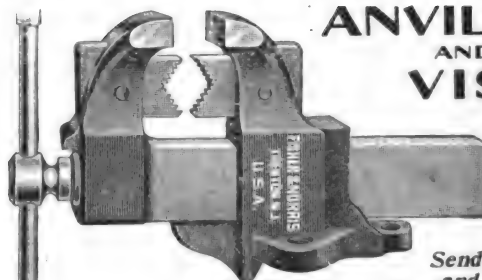
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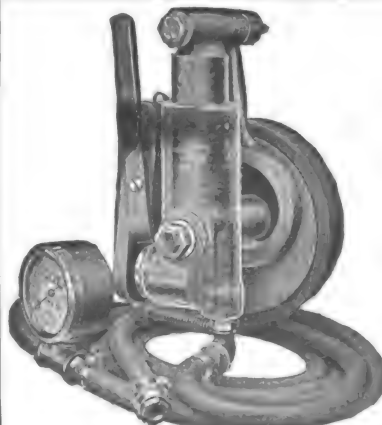
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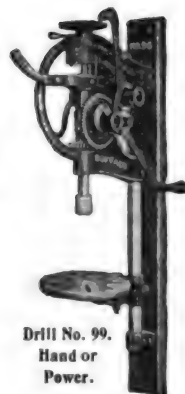
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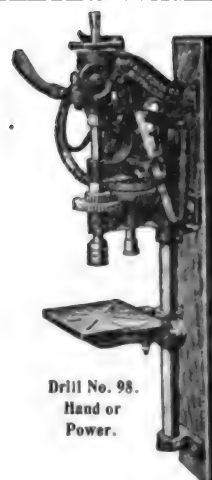
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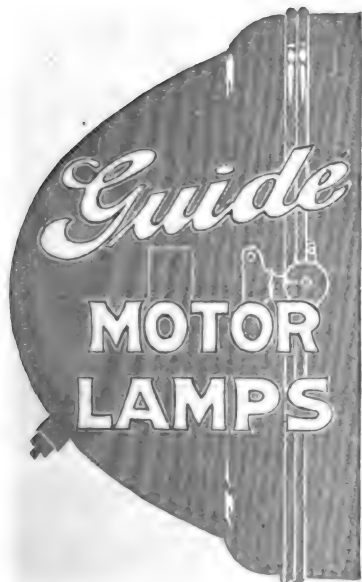
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WILL CURE THE "JERK" IN YOUR MOTOR.



End view showing arrangement of electrodes and condenser terminal.

In the "Trouble Dept." on page 60 of the August, 1911, issue, Mr. Chas. J. Root, of Geneva, N. Y., tells his experience with a

BUICK CAR and "BEST" PLUGS

He writes us

HIS TROUBLE

Could not throttle down without having an unpleasant "jerk," unless running 25 and 30 miles an hour.

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HE DETERMINED

to try a set of "Best" Plugs, figuring they would cost no more; at any rate, he could be no worse off. He tried a set.

RESULT

"Jerk" gone, can throttle down to 2 and 3 miles an hour and still have power, has speed he never before realized, has speed with power on the hills he never before experienced. Gets 17.6 miles per gallon of gasoline, is now convinced of what "Best" Plugs can do.

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Yours truly,

(Signed) CHARLES H. GORDON.

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HALF SIZE.

(Patented March, 1898—Other Patents Pending)

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BULLS EYE SPARK PLUG

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Aside from special features the best made spark plug on the market.

Ports guaranteed against breakage.

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A JOURNAL OF PRACTICAL MOTORING.

VOL. XIII, No. 2.

NEW YORK, APRIL, 1912.

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SLIDE AND POPPET VALVES.

Mr. Walker Brings Down the Subject Further, Showing How the Struggle Is Progressing.

BY SYDNEY F. WALKER.

No. 2.

As the writer understands the matter, the principal objections to the poppet valve are the noise and the power they absorb in working. As mentioned above, the poppet valve was introduced into the gas engine, after the slide valve had been working for a number of years, and had shown itself, in the opinion of both users and makers, as being unreliable. The feeling underlying the introduction of the poppet valve was, that it could be made to work properly. With the poppet valve, one could be sure that the valve admitting gas, and that admitting air, would open at the proper time, and would close at the proper time, so long as the valve itself was kept in order; and as explained below, there was not much difficulty in the way of keeping it in order. It was not the uncertain apparatus the slide valve had been. The introduction of the poppet valve for the admission of gas and air, was also an extension of the practice that had ruled with the earlier forms of gas engine, in connection with the exhaust valve. The early forms of exhaust valve were of the poppet type; and there was certainly nothing like as much trouble with them, as with the slide valve. The great difficulty about the slide valve was, as indicated above, you never know when it was going to play you some trick, and there was the greatest difficulty in locating the cause of the trick. The poppet valve was by no means an ideal valve; but it had, and has, the advantage that it is fairly easy to see when something is wrong with it, providing the observer has a very moderate amount of experience in looking after the engine. The poppet valve is subject to certain troubles. Figs. 9 and 10 may be taken as typical gas engine poppet valves. It will be noticed that there are two important features in connection with them. When the valve is closed, the surface of the moving portion of the valve must sit tight, metal to metal, and without any ridges or corrugations, upon the seat of the valve. If there is any wear, if a little bit of dirt, say a small piece of cinder gets between the valve and its seat, holding it open when it ought to be closed, the valve does not work properly. But trouble of this kind is very easily located, by any man who has a moderate experience in looking after any kind of engine using poppet valves. Everyone who has had to look after engineering appliances, knows how very quickly, if one gives one's mind to it, one gets in the way of automatically almost, finding the little causes of trouble that are so difficult for outsiders to find. A man accustomed to the work for instance, "who had been there before," to use one of the expressive American phrases, would lift the valve and feel round with his hand, if he suspected anything of the kind. Bad lubricating oil tends to give trouble

with the poppet valve, just as it did with the old slide valve, and in precisely the same way. The carbon deposited from the oil, has a tendency to be deposited in all sorts of places where it is not wanted, and amongst others, to form upon the seat of the valve, and to prevent its properly closing. In particular, it often has the knack of depositing irregularly, so that there will be corrugations, gaps between the valve and its seat, when the valve is supposed to be closed, leakage of gas or air being the result.

There is also a certain amount of wear upon both the valve and its seat, owing to the incessant hammer-

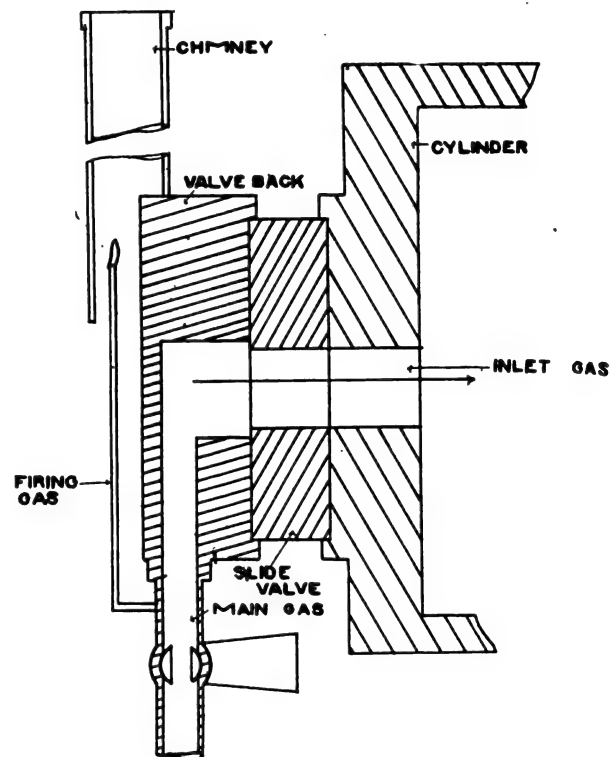


Fig. 8.—Another Form of Early Gas Engine Slide Valve.

ing action of the valve. The amount of the wear depends practically upon the quality of the material of which the valve and its seat are composed, and upon the machining, and generally upon the care with which the engine is worked. If the valve is of a hard metal, while the seat is soft, and particularly if there are inequalities in the metal of which either the valve or the seat is composed, the hammering action will lead to differences in the amount of the wear, and to leakage spaces between the two. Fig. 11 shows diagrammatically the kind of thing that may be likely to arise. What the writer has in his mind, as makers and repairs of motor car engines know can easily exist is, the seat of the valve, or the valve itself, in place of being made of good hard castiron, and of a perfectly uniform quality, all through, consists of a metal irregular in quality; harder at some points than at

others. If there are soft places in the seat of the valve, and if by any accident these should be opposite to hard places in the valve itself, the result must be a wearing away of the soft places in the seat, and probable wearing away of the soft places in the valve, if there are any, opposite to the hard places in the seat.

The result again will be, instead of the close metal to metal fit, the gastight fitting as it should be, two irregular surfaces, trying to make contact with each other, but necessarily leaving spaces between them here and there through which leakage must take place. As usual, the remedy is, good workmanship, right away through. Too great care cannot possibly be taken in selecting the metal from which the valve seats and valves are cast, no matter how they are arranged, in preparing the patterns from which they are moulded, in moulding them, and in machining them. If the metal is bad, if the maker has been tempted to save a trifle by using inferior material, or if his foundry manager, or the man who mixes his metals for him, has the idea, as workmen sometimes have, that he will be saving his employer something by putting a little inferior stuff in, in place of the proper stuff; if the pattern maker has not done his work properly; if the moulder has been careless; and if the machine man has also been careless, or has passed over such a fault as a hard or a soft place in the casting, or a defect in the casting that may lead to something of the kind, the result will be, almost to a certainty, wear at some point or other sooner or later, and the consequent leakage.

Another important and difficult matter in connection with the poppet valve is, the spring which closes the valve. It will be remembered that the practically universal arrangement is, the valve rod lifts the valve, when the cam operated by the half time shaft causes it to do so; and when the cam releases the rod, the spring which is coiled around the rod for the purpose, forces the valve down on its seat again. The spring of course should be of the very best steel, specially drawn for the purpose, and should be carefully tested. It should be able to stand a certain amount of heat, having its temperature raised to a certain extent, without losing its temper. Again there is the old tale, the question of putting in inferior materials. The making of good springs such as will go on working continuously day in day out, week in week out, is a very difficult matter indeed. It can only be accomplished by having very high class material, very good machinery, very careful testing, and very careful formation of the steel into the spring itself.

All this means the expenditure of a considerable amount of money in plant and time and labor, and particularly in highly skilled labor. It is in such matters as this that very highly skilled labor comes in, and pays for itself, though it receives very high wages and salaries. The attempt cut down the cost of any part of the material or labor of the spring, must lead to disastrous results. One of the complaints against some poppet valves is, the springs lose their tension, and do not bring the valve down upon its seat, though there is no obstruction such as those mentioned above, carbon from the lubricating oil, cinders, or dirt. It will be evident that the efficient working of an engine, depending upon a poppet valve, requires that the valve should remain absolutely closed until the moment it is required to open; that it should open quickly when the time comes, and that it should close quickly again, at the proper time. If the spring becomes so weak that it cannot force the valve down on to its seat properly, so that the all round metal to metal con-

tact is obtained, leakage results, the engine works badly, and inefficiency generally follows. It will be remembered that the whole body of the engine is warmed up to a certain temperature when working. This is practically unavoidable. The heat liberated in the cylinder is carried to the walls of the cylinder, to the water jacket, and to the outside containing wall, and thence to all the metal with which it is in contact, the valve compartments among them. In addition, the constant hammering action of the valve upon its seat, must liberate a certain quantity of heat, which is conducted from the valve to its rod, and thence to the spring. If the spring is of inferior quality, if it has not been made to withstand heat, it will soon begin to lose its tension, the valve will commence not quite to close and will be slow in closing and leakage will result.

The New Motor Slide Valve.

As readers of this magazine are aware, the lead of Mr. Knight, and the makers of his engine, the Daimler Company in the United Kingdom, has been followed by several of the other leading makers; and as men-

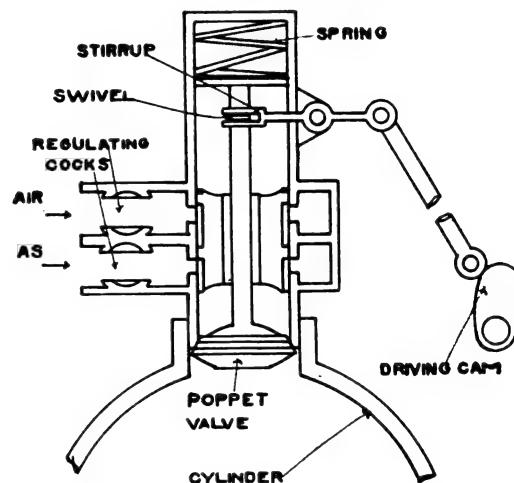


Fig. 9.—One Form of Early Gas Engine Poppet Valve.

tioned in the earlier part of this article, some of them have gone on the lines of the piston valve shown in Fig. 3 in the March issue. In the Knight engine, however, the old steam engine slide valve has been as closely copied, as the conditions under which it works would allow, with modifications introduced by Mr. Knight, that are certainly improvements upon the arrangement of the steam slide valve. A point of difference that may be noticed between the steam slide valve, and the Knight gasoline engine slide valve is, in the steam slide valve provision has to be made for admitting the steam at both ends of the cylinder, and for exhausting from both ends; in the gasoline engine admission is only on one side of the piston, and at one end of the cylinder, and exhaust is also at one end of the cylinder. This difference simplifies the problems involved in the design of the slide valve considerably, and it also tends to lessen the leakage. Another difference that will be noticed is, in the old steam slide valve the surfaces moving over each other were perfectly flat, placed true; in the Knight gasoline engine the surfaces that are in contact with each other, those of the slide, and of the cylinder itself, are cylindrical. The two parts of the slide, the two sleeves if the term may be used, are portions of a cylinder, while the surfaces over which they move are those of the cylinder itself.

Advantages of the Gasoline Slide Valve.

And now we come to the advantages of the slide valve for the gasoline engine. One advantage it undoubtedly has, viz., the suppression of the noise made by the poppet valves; though, as usual, in face of the competition of the slide valve, the noise of the poppets have been enormously reduced. It is a fairly open question whether, with the latest forms of poppet valve, and with the latest up to date manufacture, there is really a great deal in the question of the noise made by the valves. In the slide valve engine, in order to give motion to the sleeves forming the valve, an additional gearing has been introduced, which must give rise to a certain amount of noise, if it wears at all, if dirt is allowed to get in between the gear wheels, and if it is not properly lubricated. Against that there is the gearing of the half time shaft, and the possible noise made by the cam, if it is not properly lubricated.

In considering this question of the noise made by the valves, however, one should hardly go by the engine which is properly looked after, and in the early days of any new engine, for which a high price is asked, it is probable that its valves will be well looked after. The question of noise should rather be settled by what is likely to be the average amount of noise made, with the average car, and the average man to look after it. It would be equally unfair to judge either car by the second type of "Gasoline Woman" referred to in the previous issue of this article, and her probable chauffeur. There can hardly be any doubt that, given an average amount of care, and with equally good fitting, the chances of suppressing all noises are much greater with the slide valve than with the poppet valve. With the poppet valve, in spite of very care, noise may arise, and it may do so just at a time when it is most inconvenient, when it is the greatest nuisance. It will not be easy for a great amount of noise to be given out by a properly constructed slide valve engine, with a reasonable amount of looking after, and the slide valve does not appear to the present writer to be subject to the same accidents as the poppet valve.

One point again may be noticed here, and it is one upon which controversy is quite fair. The poppet valve is easily got at for repair, for cleaning, removal of any cause of knocking or leakage, etc.; the slide valve cannot be so easily got at. On the other hand, while the poppet valve is very liable to the causes of leakage that have been referred to, the slide valve, assuming careful modern fitting, and assuming the best materials, and good lubrication, is not as liable to the sources of trouble of various kinds, leading to leakage principally, as the poppet valve. In the case of the poppet valve, a very little thing, a very minute piece of grit will cause a considerable amount of trouble and leakage; and to a man who understands his engine, it will not take many minutes to remove the trouble. With the slide valve engine, it should be difficult for anything in the shape of grit, or the equivalent, to get in, and to do for the ports, what grit does for the poppet valve; but if anything of the kind does happen, considerable trouble will be experienced in putting it right.

Again we come to the old old tale of the requirement of good material, good workmanship, good oil for lubrication, and good attendance. If any one of these are absent in the case of the slide valve engine, the result to the owner may be that his engine will run very much less sweetly, will give him far more trouble than with the poppet valve, will use far more gasoline, and will be more expensive generally. With

very good cast iron, or even more expensive metal, very carefully machined indeed, by the very best of modern tools; with above all, very good lubricants, that will stand the high temperature present in every gasoline engine, and reasonably good attendance, the slide valve engine should have distinctly the advantage; should give its owner very little trouble indeed.

If the maker, however, is tempted to use inferior material which wears quickly; if the manager of his works, or whoever is responsible for seeing the work through, allows imperfectly machined cylinders or sleeves to pass; or if more than all, the owner is tempted to use an oil which carbonizes at the temperature met with, the result will be, almost without doubt, a reproduction in its own particular form, of the troubles of the steam engine slide valve. If spaces are worn between the sleeve and the cylinder wall as

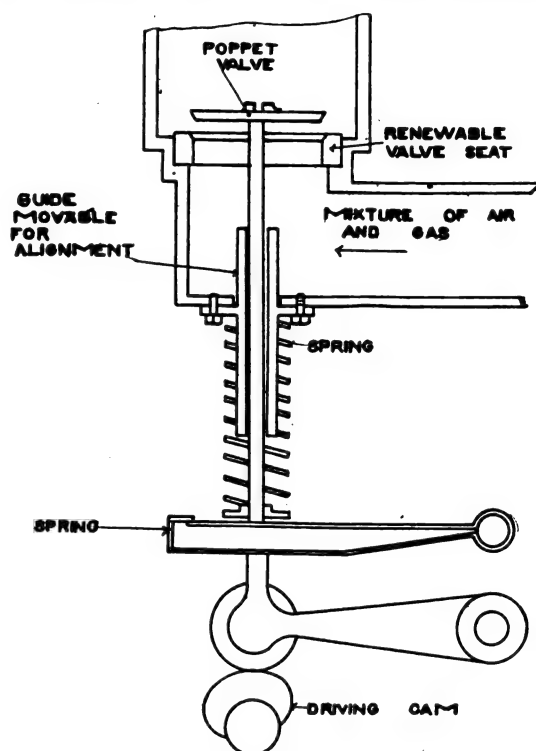


Fig. 10.—Later Form of Gas Engine Poppet Valve with Renewable Seat.

they used to be between the steam slide and the planed surface of the steam cylinder, leakage will take place, leading to waste of gasoline, and to irregular running. Bad metal for the cylinders or the sleeves, and even good metal badly machined, may lead to these troubles; but the most likely thing of all to lead to them is, an inferior lubricant.

It cannot be too often repeated, that cheap oil for a lubricant for an engine costing several thousand dollars, is very dear and very wasteful. One very small deposit of carbon, in time, may cause such a leak to the engine, that irregular running will result. The great feature usually about troubles of this kind is, they so frequently come to a head at inconvenient times. The owner of the car perhaps has a party on tour. He is taking them through some old world scenes, possibly over the Alps, through some of the old world towns of the European Continent, or over some of the lovely scenery to be found in the West and the car breaks down miles from everywhere. That is where the advantage of the poppet valve would come in. If a breakdown in such a situation did occur with

the poppet valve, the chances are that the chauffeur, if he knew his work fairly well, could fettle it up sufficiently to reach the next town, where proper repairs could be managed. If the trouble had just matured in a slide valve, the probability is he could not do anything at all. It would be absolutely necessary for him

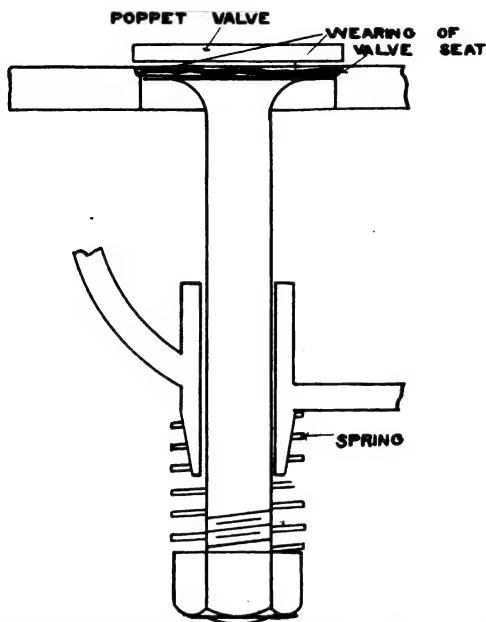


Fig. 11.—Diagrammatic View Showing the Wearing of a Poppet Valve Seat.

to dismantle the engine, and even then it is doubtful whether he could make even the temporary repairs necessary to reach the nearest town.

(To be continued next month.)

The Care of Battery Accumulators.

The use of the storage battery for the purposes of ignition on a car is still a favorite method and so long as the cells are kept in good condition there is no possible reason that could be urged against their use as the spark obtained from a battery is usually most satisfactory. It is, however, necessary to pay a certain amount of attention to the upkeep of the battery or accumulator or else trouble is likely to occur at unexpected times. If secondary cells of this sort have been kept standing for a time it will be found that they sulphate and sometimes free acid causes corrosion on the plates and on the terminals. If this becomes noticeable the accumulator should be taken to pieces and the plates should be thoroughly cleaned. In parts such as terminals which have become corroded, cleaning should be done with a piece of emery paper, after which they should receive a coating of vaseline. It is advisable that the terminals should be regularly and systematically cleaned, say once in every month or so, in order that no loss of voltage should occur due to bad contact.

It is not advisable to work cells too hard without recharging. A very good indication as to the condition of the cell is the measurement of its terminal voltage and this should be kept well up. It is not advisable to let them run below two volts per cell unless for some special reason, although on long tours where charging stations are not numerous it is sometimes necessary to let them go down to 1.8 volts. When fully charged a four volt accumulator for ignition purposes should require a terminal voltage of about 4.5 volts. Another point which should be watched is to keep the acid just above the level of the top edge of the plates if any of the acid evaporates a little distilled water should be

added in order to make good the loss. The reason for this is that the evaporation is that of the water mixed with the acid and not the acid itself, so that the distilled water which is added brings back the strength of the acid solution to its proper value without further correction. In order, however, to make sure that the acid is of the proper strength it is advisable to test for this by using a gauge, sold for the purpose, to determine its specific gravity. It should be noted however, that the specific gravity changes according to the charged or uncharged condition of the cells so that specific gravity measurements should always be taken at one condition of the cells, say when fully charged, so that a comparison of the readings from time to time will show whether the cell is in good condition or not.

Yet another point to be remembered about accumulator batteries is that they should always be placed where they will not be jolted about unduly or subjected to excessive vibration. A certain amount of vibration is of course always present, but the plates of the cells which are the weakest part of the construction are nowadays so constructed that the paste will not fall out unless vibration is very excessive. If they are allowed to stand loose, however, they are likely to jump about and become broken, and therefore the best way to carry a set of accumulators on the car is to pack them tightly in a wooden box.

A Broken Ball in the Front Wheel.

The introduction of the ball bearing marked a distinct stage in the evolution of vehicles, and it is today one of the most usual means known of reducing friction in motor car drives. At the same time although the steel balls contained in the ring are as a rule beautifully made and hardened, there is just the danger that occasionally one of these may break, in which case it is advisable that very prompt attention should be given to the matter as the ball race may easily become damaged beyond repair by the broken fragments.

The fracture of a ball can very often be detected by the unusual noise which is found in the ball race, due to the grinding together of the separated portions. For example, when a garage attendant was washing a car one day he had one of the front wheels jacked up in order to clean it, and as he turned the wheel he could hear a mysterious cracking noise together with a grating sound. On the mechanic being called to inspect the car, he thought at first that there was some grit in the bearings of the wheel, and he took off the cap and with a gasoline squirt washed out the bearing. This, however, did not alter the cracking noise, so he took off the wheel and bearing and thoroughly cleaned it. He then discovered that one of the balls in one of the ball races was broken, and unfortunately the race had got considerably damaged. This of course meant having a new ball race and after that was fitted the noise ceased. It may be interesting to mention in connection with this matter that the bearings of the front wheels should always be kept thoroughly greased in order to give the balls the best chance of running smoothly, and a mixture of grease and oil is advisable for this purpose.

The Cause of Overheating and Loss of Power.

One of the most important parts of the work of a car driver is to be able to quickly and accurately find out the cause of trouble when anything is going wrong with his engine. Sometimes this is a fairly simple matter to accomplish, but on other occasions the trouble is a little more obscure. One day when a driver was taking out the car he noticed that his engine got very hot in-

deed and there was a very serious loss of power. This in a very short time became so bad that occasionally the engine would stop altogether. At first he put the trouble down to the carburetor or the ignition and tried to get the matter remedied along that line, but in spite of all he could do, nothing seemed to put the matter right, and the defect existed for some little time. At last, however, as the engine kept stopping, the driver on reaching home took out the valves to grind them in and he then found that the inlet valve was rather tight in the guide and also that the cap which held the spring was too tight. This appeared to give a clue to the trouble, and the driver smoothed down the surface of the valve stem with emery paper and oil, taking off enough metal to allow the valve stem to run free in the guide and also in the cap. After this overhaul the valves were put back in position and the car was tried, and it was then found that the trouble had entirely ceased and the car ran splendidly. Hence the cause of all this trouble was very simple, being only the sticking of the inlet valve, but nevertheless it was rather difficult to trace out.

PAINTING METAL BODIES.

Why This Gives Trouble to Both the Owner and the Painter.

From A. H. Mauerman, Wisconsin.—I will ask a favor of you about paint coming off automobiles. I am an owner of a Clark car and have had it about a year. The paint is flaking off on the back seat and one rear door. The body of the car is made of aluminoid. Now I do not know whether it is the paint or if it is caused by cold freezing weather. The paint just came off during the cold weather in January, when it was about twenty degrees below zero. The spots are not very large. The space on the seat is about two feet long and a foot wide, and the space on the rear door is a round spot about five inches across. I had the car covered all through the winter, cleaned it up good before putting it away, and it is not damp in the shed.

Reply by M. C. Hillick.—The metal car body is giving the painter and the car owner about an equal share of concern, for both are having their troubles with it. Especially during the past winter has the metal body furnished an opportunity for everybody interested to pass an opinion, expert or otherwise, upon the wearing properties of paint applied over it. In getting at the relative paint values, as shown upon the wood and the metal body, we must first recognize the fact that there is a decided difference between the two in their capacity to receive and retain the paint fabric under the varying and exacting conditions of service.

When the primary coats are in place and the precise requirements of the metal surface have been given due allowance, there is no reason in the world, that we are aware of, why the finish on the metal surface shouldn't wear as well and as long as a like finish should wear on the wood surface. Barring accidents we believe that it will. In going about the work of painting the metal body, if a new surface, the naturally negative face of the metal must always be taken into account. Instead of using the same amount of oil necessary for a pigment to be applied to the wood surface, this quantity needs to be reduced to quite an extent, otherwise it will dry slow and uncertainly and the chief purpose of the priming will be defeated. The metal will not absorb oil to any appreciable extent except it be present in the pigment in connection with a considerable quantity of turpentine. Under this adjustment of ingredients

the oil is sufficiently reduced in body to at least get a fair foothold, and this means much for a paint on the steel car.

Of surfacing paints for the metal car body there is a big brood to pick from. Transparent primers, white lead, red lead, mineral brown paints, and paint combinations made up largely of two or more of these paints, constitute the leading first coat materials. Practically any of these paints, if made up with the proper proportions of thinning and binding mediums, will give good service. Use, say, for the primer, one-third raw linseed oil and two-thirds turpentine with a few drops of coach japan to each pint of the mixture to clinch the drying contract. The next coat should carry one part oil to 6 or 7 parts turpentine. Above this coat bring the painting and finishing processes along in quite the same way as for the wood surface. This, in a brief way, is the sum of the whole matter of getting a durable finish upon the steel car.

Other things being equal, the finish upon the metal car body worked up in its primary stages as above outlined should wear in a very strong and durable way.

The experiences of Mr. Mauerman is not unusual in connection with the steel car, although ordinarily it occurs on a surface recently painted and varnished that has first been subjected to a high heat during which the metal has expanded. Removing this same surface to the cold outside air and forcing the metal to suddenly contract is about certain to break up the finish and force it to peel and flake off.

This same disastrous termination of the finish occasionally occurs on cars that have been in service for several months, or for a year or more, and is primarily due to the sudden contraction of the metal during unusual extremes of zero weather.

The substance of the situation is that the painter's skill in painting and finishing the car in the best possible manner must be supplemented by reasonable care and attention to the work when in service by the owner.

What the painter has wrought on the surface of the car may be classed only as a "passing show" unless the owner elects to give the finished work proper caretaking.

Nothing helps the surface more to withstand the bitter days of service to which it is exposed than a good foundation of varnish. This, for a first class job, should consist of a coat of varnish color, two coats of clear rubbing varnish, and one coat of finishing varnish. Such a surface of varnish when it has worn to a point where it needs a renewing and renovating treatment, has sufficient depth and substance to respond to the mediums applied and "comes back" with much of the lustre and brilliancy of its former self.

As a concluding word, the metal car body should be well and carefully painted and finished, and during its days of service it is entitled to all the care and attention that the appreciative owner is able to give it.

Waste of Grease in the Gear Box.

Attention has over and over again been drawn to the fact that a too generous lubrication of the engine itself is not only wasteful, but produces positive harm, as the clearances of the engine get choked up with soot and a lot more is caught in the muffler, even although an evil smelling vapor passes out into the street from the exhaust to the annoyance of everybody concerned. There is, however, another department in which waste of lubri-

cation frequently occurs, and this is in connection with the power transmission gearing. In one such instance the driver noticed that the clutch brake and gear box on the car were smothered in grease which had worked out at the ends of the shaft and the gear box. The effect of this was not only that fresh grease had continually to be put into the gear box which cost money, but also that the grease which was thrown on to the clutch, which was thrown on to the clutch, which was a leather faced one, had a tendency to make it slip. For this reason it was necessary to take down the gear box and try to stop the trouble, and on taking down the packing glands it was found that the felt washers which were already in the glands were very much worn and were too thin for their purpose. For this reason new felt washers were cut, and after fitting them the grease was prevented from working out. The point is not perhaps a very great one, but it is worth while remembering.

GARAGE CONVENIENCES.

An Under Body Floor Truck—Double Lamp Control—A Return Call Bell.

BY JAMES F. HOBART, M. E.

Every time I see a man lie down on his back and worm his way under an automobile, my heart goes out

The casters are a little more than $1\frac{1}{2}$ inches high, and with the slats and cross-pieces, the total height of the truck is $2\frac{3}{4}$ inches.

A sort of pillow, C, is provided for supporting the head while lying on the truck. The pillow may be a roll of sacking, an old cushion, or a flour sack stuffed with excelsior, as may be convenient. All that is necessary is something to keep the head high enough to enable the workman to see directly upward with his eyes front. A very good and a very sanitary arrangement, is a section cut off one end of a roll of building felt. Select a roll about 5 or 6 inches in diameter which has an eye at least 2 inches through. Flatten the cut-off portion of the roll and put it under a weight until it will stay flat, then the truck pillow is finished and is quickly cleaned when necessary by simply unwinding and tearing off a single thickness of paper. In this way, the pillow can always be kept sanitary, something which cannot be said of a roll of cloth or a cushion.

To use the truck, the workman simply lies down upon it, flat on his back and with his heels, pushing against the floor of the garage, he can quickly and easily propel the truck and its load to the exact spot most convenient to the work to be done. The casters being placed well amidships, thus making the wheel base very short, the truck becomes very "touchy" in its steering, and may be easily directed to right or left, the ball bearings permit-

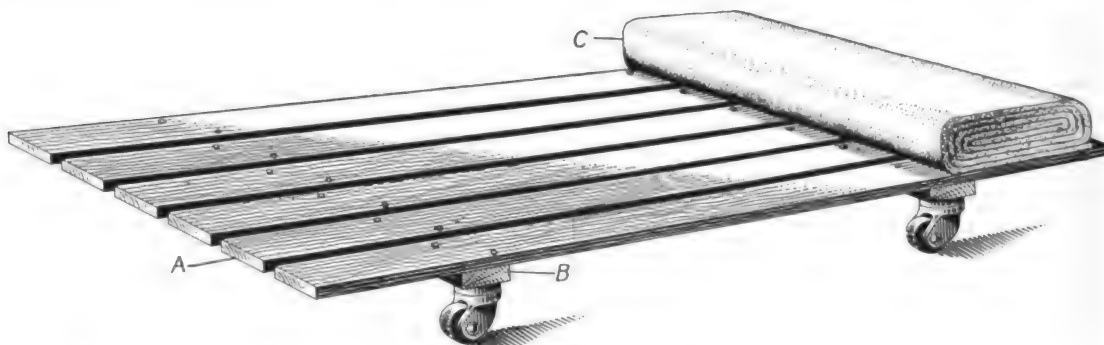


Fig. 1.—Convenient Underbody Truck.

in sympathy for "the under dog" and I can hardly repress the ejaculation, "Sick 'em Tige," to egg on the workman who is doing the caterpillar act. A good deal has been said about pits and turntables in garages but the fact exists that some have neither convenience and the work must be done without them. Turntables are on the market now which require no excavation and may be placed directly on, or in the garage floor, and such turntables may be found in the advertising columns.

But until a pit or a turntable can be procured, the little device illustrated by Fig. 1, herewith, will certainly be found a great convenience. It can be made up in the shop, by a workman, in less than a day, and as far as the writer knows, it has not been patented. It was first seen by the writer in the garage of Messrs. Snyder Brothers, Barberton, Ohio. As shown, it consists of a light wooden body, mounted upon four ball-bearing casters. The balls in the casters are not in the bearing about which the wheels revolve, but are in the little turntable in each caster. The wheels are about $1\frac{1}{2}$ inches in diameter and can be obtained at almost any hardware store.

The body of the truck is composed of six slats, hardwood, $\frac{3}{8}$ inch to $\frac{1}{2}$ inch thick and about 2 inches wide. The length is about 3 feet. These pieces, A, are separated about their thicknesses and screwed to the cross pieces, B, to which also the casters are screwed, thus making additional fastening for the outside strips A.

ting the casters to take sidewise directions under the least impulse from heels or hands.

Once under the automobile, the truck is moved readily by the hands, and after a short time in use the workman puts himself exactly where convenient to the work, with the greatest of ease and almost unconsciously. It only requires about one second of time for a man to get under, or to come out from under an automobile with this handy little truck and it will prove a great time-saver in any garage.

If desired, sheet iron shelves may be added between the truck casters, and at the head and foot of the device. These shelves can be an inch and a half from the under side of the truck body, and may be utilized for holding tools which the workman desires to use while under the automobile. But a much better way is to make another truck, especially for tools, with platform and a few low shelves and a small vise may be added with fine results. This truck, loaded with the tools probably required while under the machine, may be pushed in where it will be within easy reach of the workman who is to do the (under dog) act, and there should be no means be forgotten to attach a sort of "lazy-tongs" light holder. This appliance to be fixed to the head of the man truck by means of a thumb-screw and may be built permanently into the tool truck. The device is to be made so that it can be twisted into any imaginable position within a radius of three feet and there hold securely an incan-

descent lamp in a wire cage. With this method of light arrangement, the workman can accomplish three times as much while under a car as he can where he has to hold a lamp with one hand and work with the other. A pair of trucks as described, will enable one man to execute as much underneath work as can be accomplished by four men who crawl in and throw tools and material on the floor.

The tool truck is also first class for removing and replacing parts of the automobile machinery. A man using the tool truck, places all the parts upon the truck, and they do not have to be hunted up from a dusty

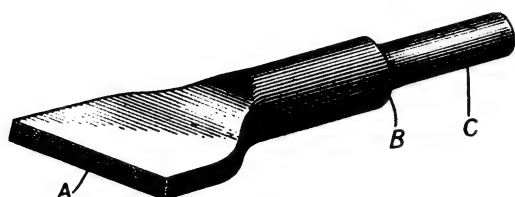


Fig. 2.—Paint Removing Bit.

floor. In replacing the new or repaired parts, they may be placed in order upon the tool truck, and be always ready for the hand and remain clean and free from floor-dust when put in position. Truly, several of the little trucks will be found a great convenience in any garage and they will prove the most labor-saving investment ever put into the garage.

For cleaning and painting the under body, a couple of these trucks are the handiest ever. With tools and paint on one truck and the painter on the other, not a minute is lost, and above all the workman does the labor in comfort and cleanliness. Paint removing is one place where the trucks come into play nicely. Talk as you may, about the only way to get old paint off an automobile is to scrape it off, and for the underbody work, the little trucks will be indispensable after a man has used them just once.

The attempt may be made to remove paint by burning it off, or by the use of one of the several paint removers in the market. But the writer has found that the use of heat requires a whole lot of scraping after the burning has been done as well as possible, and while



Fig. 3.—Paint Removing Bit

the removers will certainly do the work, eventually their action requires so much time and the after cleaning and drying are so tedious and "messy," that the scraping off of the entire coat of paint is about the best way to treat automobile surfaces to fit them for repainting.

When the garage has a liberal supply of compressed air, as each garage should have, a light pneumatic hammer will scrape off more paint than a dozen men with paint removers or gasoline torches. Just make up a special chisel-shaped tool, put it into the air hammer, and go ahead. The manner in which that device will walk over immense surfaces of metal will be a glad surprise to the man who sees its action for the first time. With several bits or tools, some wide, others narrow, a few grooved or rounded to fit various curved surfaces, the act of removing a whole lot of old paint becomes as easy as getting black oil on a pair of new duck pants.

A couple of pneumatic tools are shown by Fig. 2 and

Fig. 3. The large flat bit, Fig. 2, is to be used on flat surfaces. Its width may be made as great as the muscle of the operator can hold against the paint coating and not let the tool slip up and slide over the coating. Probably three inches wide will be the limit for most workmen to handle. Tools of almost the shape required may be purchased at almost any hardware store by calling for a "breaking-off chisel." The tool as purchased, will have to be turned or forged down to fit the pneumatic drill tool and the necessary shank, as shown at C, is almost exactly like the shank of a common twist drill.

Care must be taken, in fitting the bits, that the bearing is along C, and that the tool does not touch at B. The same is true in fitting drills to the chucks or spindles of lathes and drill presses. Fig. 2 shows a form of tool adapted to removing paint from curved surfaces. The curve at A is made just a trifle larger than the shape to be cleaned of paint but a tool of this kind can be used for several sizes of rod, each somewhere near the radius of the tool.

In grinding these tools, the bevel at Fig. 2 and A, Fig. 3, should be the same as in a hand scraper, almost square across, or a little less than 90 degrees. The sharper the bevel, the more readily the tool will "take hold" but the quicker will the edge be worn off and then the tool will "dodge" and a good cut cannot

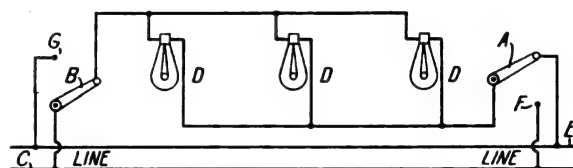


Fig. 4.—Double Lamp Control.

be taken, even when the workman puts his whole weight against it. Therefore, grind different bevels and experiment with them until you find the shape which works best with your particular handling of the tool.

It will be noted that the edges of tool, Fig. 3, are rounded. This is for the purpose of getting into grooves or into corners where there is a fillet. The corners of the tool are likewise to be used in corners where there is no round or fillet. While these tools will do the work easily and well when they are sharp and ground just right, they will not work satisfactorily when the scraping angle is a little out of shape. Therefore, if the tool fails to do a whole lot of good work, see to the cutting or scraping bevels and make them sharp, square, and a few degrees off from 90 degrees. This important matter being adjusted properly, the best paint remover in the world for use on metal surfaces, is ready for instant use.

Users of the electric light find that in spite of the representations of solicitors and central station men, that "juice" does cost a whole lot, and that bills can be materially lessened by care in turning out lamps as soon as done with them. A half a dozen incandescent lamps left burning for a few hours, soon runs into kilowatts, and these mean dimes, every time.

By a little ingenuity, lamps may be arranged in the garage so as to be turned off quickly when not needed. It often pays to arrange the lighting circuits so the lamps may be turned off and on from more than one part of the garage. This is particularly true when there are lights in a long room or passage way. To walk to the end of the passage and turn off the lights every time they are used would cost more for time than would be saved in cost of electricity, but with the circuits so arranged that the lamps in a passage can be turned on as

a man passes in, and turned out as he leaves, then there is a fine chance for saving a little in "current expenses"—no joke intended.

Fig. 3, illustrates a form of circuit whereby lamps may be turned off or on at either end of a room or passageway. It matters not whether the lamps have been turned on at one station or the other, they can always be turned in or out, at either of the switches. As shown by Fig. 4, the lamps are "on." Current flows from line F, through switch A, thence through lamps D, D, D, to the other switch B. As many lamps may be placed in this circuit as desired, from one to the full number allowed on a single connection by the wiring inspector. Probably, only two or three lamps will be required, even if one is not sufficient, but the inspection requirements usually limit each group to five or six lamps upon a single circuit.

From switch B, current passes to the line again at C. To turn out this group of lights it is only necessary to throw either switch A or B. If A be thrown over, the lamps will be simply in a shunt of line C, and while a little current will flow through the lamps, it is not enough to affect them perceptibly. Indeed, quite delicate instruments would be required to measure the slight

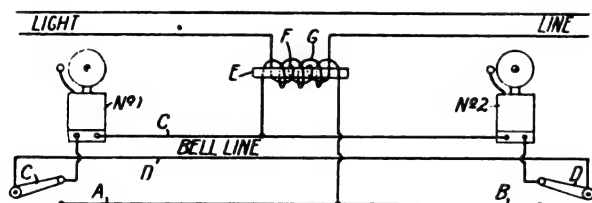


Fig. 5.—Lighting Current. Return Call Bells.

current which would pass through the resistance of the three lamps in the shunt. Certainly, there would never be current enough to make the lamps glow, even the least bit.

But instead of cutting off the lights by switch A, switch B should be operated. Then the lamps would be shunted upon line C, and the action of current would be the same as before. While the illustration shows plain swing switches at A, and at B, knife switches may be used for this purpose, and there is a double pole snap switch made for such work as this. The double switch looks and is operated exactly like the common thumb turnbuckle by which incandescent electric lamps are turned on and off. The switch is so arranged that when it snaps over, the connecting lever or turn, simply passes from one contact to the other, as from A, to F, or from F, to A. These switches, known as "double contact snap switches" are screwed to the wall at convenient points and the wires carried to the switches exactly as shown at A and B.

This manner of double switch lamp control may be extended indefinitely and any number of control switches placed in a single circuit. The manner of connecting up is left undescribed and our "electrical autoists" may exercise their ingenuity by studying out a method of connecting up four double snap switches so as to control from four points the group of lamps shown by Fig. 4.

Much the same principle as is employed in the lighting arrangement in Fig. 4 may be used to operate a return call bell system as shown by Fig. 5. It is often necessary to put in a call bell to notify parties to come to telephone, to dinner, or to "pay a bill," and when a bell is rung at a distant point the ringer has no way of knowing that the signal has to be answered unless a return signal can be received.

Fig. 5, shows a return call bell installation, which may

be operated directly from the lighting circuit by using bells wound for the lighting current. The same arrangement may be used with battery current, or by slightly changing the connections, separate batteries may be placed at A and at B, connected directly with line C and the wire between A and B, or between the two separate batteries, may be omitted, thus making a straight two wire return call bell system instead of the three wires shown in the engraving. This would be an advantage when the distance between bells is many rods or perhaps miles.

The engraving shows the bell system connected up to use current from a little home-made transformer in one side of the main light line leads. Use may be made of two transformers instead of two batteries, if a two-wire system is to be used. But for usual installations, the scheme shown by Fig. 4 is good, the extra wire amounting to a very little over the short distances usually covered by call bell systems.

The engraving leaves little description necessary, except to state that common double-contact push buttons may be used instead of the switches C, D, except in case of the bells being operated directly by lighting current, when the double-pole snap switches should be used the same as in Fig. 4. But bells operated by electric light current rarely work very well. The current is too heavy and in case of jingle bells like those shown, the contacts soon go bad and need constant attention.

It is much better to make up a small transformer and operate the bells by induced current from the transformer, as shown by Fig. 5. This little appliance is very simple. It is made up of the soft steel core, E. A bundle of wires is best, same as the core of an induction or spark coil. Around the core is wound the two circuits, F and G. The amount of wire in each of these circuits may be calculated with exactness, but the amount may also be determined by trial. Wind a few turns of live light wire around the core, then wind on a few turns of the bell circuit wire and try the bell. Add or remove coils from either circuit until the bells work satisfactorily.

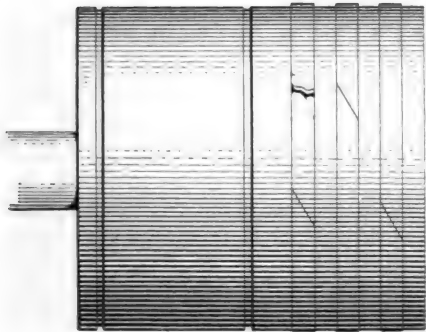
But bear in mind that a transformer of this kind will work only when the alternating current is used in the lighting circuit.

Trouble with the Motor Car Engine.

It cannot be too strongly impressed upon users of cars that it is not advisable to run for an indefinite period when things appear to be a little bit wrong. As an example of this, a little incident may be related which illustrates the point. It was found that a car which had been running quite satisfactorily for a long time, suddenly developed a considerable reluctance to starting at the beginning of the day's work when the engine cylinder was cold. The carburetor was flooded and the ignition switched on, but even after vigorous cranking over of the engine it was found that it would not start except with very great difficulty and after a huge amount of labor. Later on in the day, however, even if the car was stopped, it started up again with a fair amount of ease. It was only at the beginning of the day that all this trouble occurred. Some owners would have let this state of things continue with occasional anathemas against the makers of the car, but in this case the trouble was regarded as a signal for an efficient overhaul to be made.

First of all the plugs were examined and it was found that these sparked all right. It was also seen that the jet was clear and the carburetor was cleaned, and there really seemed to be no reason why the engine should not

start. It occurred to the driver that the joints on the induction pipe might leak, and in this way air might have found its way into the cylinder, and so weaken the mixture. The induction pipes were then very carefully examined but they were found to be in order. As a final step it was decided to try the compression of the engine and this appeared to be a little at fault as it was not quite as good as it should be. This led to the discovery of the cause of the trouble. On taking off the cylinder it was found that there was a broken piston ring which of course, made the gas escape, and this was obviously the cause of the trouble when the cylinder and ring were cold. Later on when heating had taken place there was naturally expansion of the metal and the break in the ring closed up sufficiently to retain the bulk of the



A Broken Piston Ring.

gas which had to be ignited, and hence there was not so much trouble later on in the day as at the start. This explained all the symptoms, and on having a new ring and assembling the engine again it was found that the car started up all right.

TIRES AND GUARANTEES.

The Experience of One User with Seconds and the Unguaranteed.

From Elmer G. Dills, Ohio.—I see in the March issue a communication from William Kuhlman, Texas, which I think I can fully answer, in regard to guaranteed and unguaranteed tires. I wish first to be understood as being entirely disinterested in the tire game except as a user, as I have five cars out and have some experience both with tires and the repair of same. I am very much of a "second" or cheap tire "fiend" myself and will start this article by saying my first experience was by buying two 32x4 inch seconds of a much advertised dealer. They ran about ten miles—no further—and the bead blew off of one nearly half way round and the other one about six inches round. I had the one with the smallest blow out vulcanized but it all went to pieces the first mile, so you see my first experience with "seconds" was rather unfortunate which was only aggravated by the factory making these casings positively refusing to fix them, either as a partial replacement or even though I paid full price, giving as their reason that they were "seconds" and bore no guarantee. This alone ought to show you that those dealers who sell tires—not guaranteed—so cheap, as "seconds" are the dumping grounds for unscrupulous manufacturers who unload their experiments and accumulated junk on the aforesaid cheap dealers. In turn the dealers put these tires through a superfluous fixing process to cover up the defects. Sometimes you get a good tire, but that is a rare accident.

Again I ordered a tire for a friend of mine. He is a friend no longer. This tire came from Chicago. Can furnish names on request of both of these firms if you

like. This tire was 30x3½ inches and cost unguaranteed \$18. It only lasted about six miles and blew out as the car was standing still. Nothing doing in the way of replacement, or partial replacement, as the tire was a "second" and unguaranteed. I could give you a dozen such experiences that I have had and know of but hope these will suffice.

The main trouble with the tire problem is right here: The tire factories are a perfect unit and work in harmony. There is no competition, but by a world wide advertising campaign they spend millions to create a demand for their goods and the tire user pays the bill, or part of it, when he buys a tire. Just here is where the cheap "second" man steps in and reaps his harvest by selling you factory junk at reduced prices, which makes him a nice profit, helps the factory to clean up "screenings" and makes the man sore who buys them.

Yes, we ought to get some relief in the price of tires but it is out of the frying pan into the fire to buy this whitewashed junk from the wildcat "second" firms after my experience with this "second" proposition.

I sent direct to the factory (I won't mention the name as this is no advertisement), got two new casings with the name on, and have used them two years and not one puncture or blow-out. The conclusion from this is that it is cheaper in the long run to get a first-class tire—one that is guaranteed—even though you do have to pay a stiff price for it, for the guarantee will give you the worth of your money in mileage, while the "second" is dear at any price not speaking of the positive danger attending the bursting of a tire. I have those "seconds" in my store at the present time as a horrible example. You should see them and you would not wonder why the name is buffed off.

Finally: Beware of a tire with the manufacturer's name buffed off or obliterated unless you want to be humbugged or close it out very soon at four or five cents per pound.

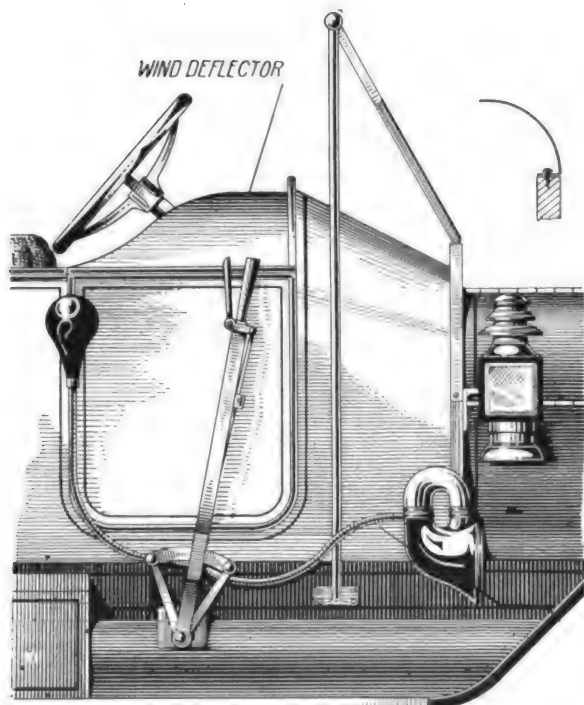
A Knock on the Engine and How It Was Cured.

Whenever a trained driver hears an unusual sound in his engine, if he is a wise man he will on the very earliest opportunity investigate the cause of the trouble. On one occasion the driver of a car heard a loud knocking on the engine and so took the cylinder off, to find that the big end bearing was rather slack on the crank shaft. This slackness of course gave it a good deal of play. After taking down the crank case so as to get at the bearing, this bearing was then taken out. In order to get an accurate fit again the bearing was filed a little bit at a time at each end and tried on the crank shaft after every little portion had been taken off. After a little while spent in filing and trying on, a fairly tight fit was obtained. Care was of course taken not to allow the fit to become too tight for fear of subsequent heating up and friction trouble, but the fitting was carried to such a point that the piston could be carried from side to side by its own weight.

In cases where the bearing is worn to a very considerable extent filing in the manner above described is not sufficient, and it is necessary to scrape up the surface with a specially prepared scraper. This may be very nicely made out of an old file with its end ground down to a fairly fine cutting edge and then hardened and tempered. When the bearing is finally fitted to the shaft so that a true and even bearing is obtained all over, it should, before being put into motion again be thoroughly oiled all over, or otherwise in the preliminary run it might seize up, which would involve a very serious amount of extra trouble.

A Wind Deflector.

Nothing conduces more to comfort than a hinged scuttle or lid to both the back and front seats of a car, but these scuttles are always a nuisance when getting in and out of the car, particularly in the case of the front seats. To overcome the difficulty have the dashboard and screen brought as far back as possible without interfering with the door, while the door itself has a curved wing fitted to it. This wing is made of sheet steel, and is firmly bolted along the top of the door, so that it is a part of the door and opens and closes with it. The sketch shows its construction so plainly that very little explanation is necessary. The form of the curved extension can be varied to suit the design and dimensions of the car, but wings no larger than



the one we show keep out cross draughts exceedingly well. On the opposite side of the car there is no door, so that the wing extension on that side is fixed, not only to the side of the car, but also to the dashboard. If desired, this wing on the driver's side can be considerably larger, and may extend as far into the car as convenient; of course, the bigger it is, the more protection it will afford. The metal wing extension to the door is not only far more sightly, but far more useful than the absurd little bolsters or upholstery rolls which some people insist on having put on their doors, as though the doors were intended for seats.

To Make a Valve Tappet Silent.

Many cars fitted with engines of the mushroom valve variety have covers fitted over the valve stems to deaden the noise caused by the working of the valves. In old cars it is not easy to design a simple and efficient cover, but a substitute can be made in a few minutes as follows: A piece of ordinary hose pipe should be procured for each valve of an internal diameter a little greater than the external diameter of the valve spring, and a length cut sufficiently long to cover both the spring and the valve guides above and below. This piece should then be cut longitudinally, when it can be slipped over the spring and guides. It may be secured to the latter with a hitch of wire or twine, or with connection

clips. Should the spring be much larger than the valve guides a piece of hose of a smaller diameter might be slipped over the guides to bring them up to the size of the spring. It is extraordinary what a difference this simple fitting makes in the quiet running of an old engine.

How Farmers Buy Automobiles.

According to the well-known publication of the Northwest, *The Farmer*, on November 1, 1911, there were registered in the State of Minnesota 17,652 cars, against 6,282 cars on November 1, 1909.

A summary of the total number of cars registered from each class of towns by size in 1909 and 1911 shows:

Size of Towns.	No. of cars.	
	1911	1909
Under 1,000	5,760	1,169
1,000 to 2,000.....	2,249	705
2,000 to 3,000.....	1,014	280
3,000 to 4,000.....	432	87
4,000 to 5,000.....	222	84
5,000 to 6,000.....	265	136
6,000 to 7,000.....	404	153
7,000 to 8,000.....	132	62
8,000 to 9,000.....	100	90
9,000 to 10,000.....	194	67
10,000 to 20,000.....	742	252
20,000 and over.....	6,138	3,197

In all towns.....17,652 6,282

The increase for the entire State was 255 per cent., while the increase in cars in towns of less than 1,000 was 392 per cent.; in towns from 1,000 to 2,000, 219 per cent.; in towns from 2,000 to 3,000, 262 per cent., and in towns from 3,000 to 4,000, 396.5 per cent. In towns of larger population the increases were a great deal less. This shows that the biggest element of the automobile buying population comes from the rural districts.

Use of Heavy Shears.

A clever user of tinners' scissors says it takes an apprentice months of constant use to learn the art of shearing metal cleanly and sharply without burring the edge. The shear blades should be hollow ground, the edges curving towards each other, and, contrary to the expectation of most amateurs, must be quite loose on the rivet.

In addition to straight snips, there are the bent variety for cutting curves, which are, if anything, easier to use.

Many ingenious varieties of snips are offered to the public, with serrated edged blades for gripping the metal, springs to release the blades, etc., but the accomplished tinman will have none of these—his horny hand scorns such adventitious aids. To the amateur, however, probably the safest and easiest way to shear metal is to clamp one handle of the snips in the vise, on the principle of the stock shears, and work the other by hand.

Exhaust Valve Cap Troubles.

One day while a car was being driven under circumstances which rendered independence of garages or workshops particularly necessary, the driver heard a loud hissing noise, and at the same time felt that his engine had lost considerable power. He therefore stopped the car and after opening the bonnet and trying

the compression by turning the starting handle, he discovered that the packing on the exhaust valve cap had been blown away. The proper remedy to have adopted was to have applied a copper-asbestos washer, but this did not happen to be on board at the time, and therefore the driver had to make use of a piece of asbestos string. When this had been applied and the cap had been screwed down tight again the loss of compression was no longer discernible and in the absence of a washer the asbestos string carried the car through until an asbestos washer was obtainable. This was then fitted into place in order to make a permanent repair.

A Cure for Leaky Valve Tappets.

It is often found that no matter how much the oil supply within the crank chamber is cut down a certain amount of oil persists in leaking out between the valve tappet guides and the tappets, and especially is this the case when an engine has been in use for some time, and the guides have become worn. We have lately been informed of two methods of preventing this leakage, and although we have not actually tested the methods they are said to be quite satisfactory in achieving their purpose.

Referring to the accompanying sketch (Fig. 1), this shows one of the methods alluded to. It will be

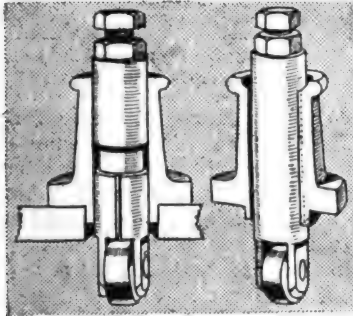


Fig. 1.

Fig. 2.

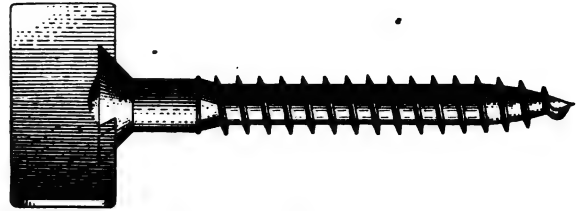
noticed that a circumferential groove has been formed in the valve tappet, this groove being about one-eighth of an inch deep and about half an inch wide. Running into this groove from the lower end of the tappet are two slots, one on each side. It will be gathered that any surplus oil finding its way between the tappet and the guide gathers in the circumferential groove and runs back into the base chamber through the communicating slots. This method does not rob the upper part of the tappet of lubrication, but only arrests the superfluous oil.

Another very good method of preventing oil leakage from this same source is shown in Fig. 2. The tappet guide in this case is cupped slightly at the top and two grooves are cut in the guide, one on each side from top to bottom. In this way the superfluous oil finds its way to the top of the guide, gathers in the cupped end, and runs back again into the base chamber through the two grooves. The latter method has been adopted by a well-known firm of car manufacturers who previously received some complaints with regard to oil leakage at the tappets.

A Little Wrinkle.

The designer of an automobile usually sees after the important parts of the mechanism in a thoroughly satisfactory manner and it does not therefore fall to the lot of the driver or garage engineer to worry much about the main design of a motor car except when he finds himself up against defects in such designs rendering

running repairs necessary. In the small details, however, of the accessory parts there are frequently little refinements which can be introduced which materially add to the satisfactory running of the car and it may be worth while mentioning one which has been found advantageous. It is a dodge for making a thumb screw out of an ordinary screw and is of advantage because a thumb screw is a thing which is very convenient on a car especially for such parts as the carburetor, contact breaker and similar parts of the car. The ordinary



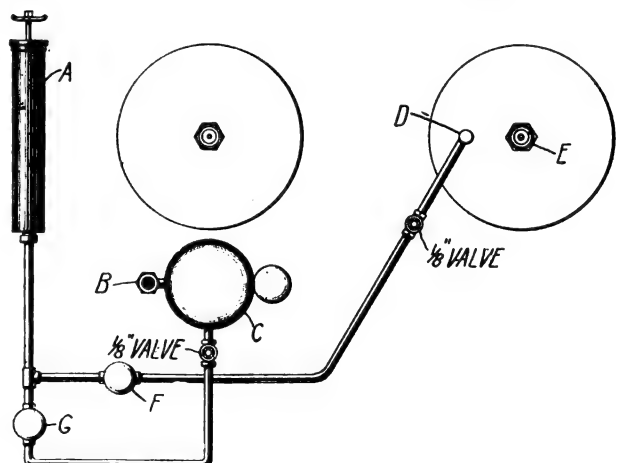
Converted to a Thumb Screw.

screw can easily be converted into a thumb screw by obtaining a piece of sheet metal which may be brass or steel as the case may be, and if this is too thick to be fitted into the cross cut of the screw it should be filed to the required thickness and then soldered into the cross cut. After this it can be shaped up with a file so as to make it look a good job. If necessary the cross cut itself can be filed out to a convenient thickness to take a suitable piece of metal sheet. These thumb screws can be more widely applied than is usually realized. For example, they are very convenient for bolts that are often taken out for cleaning purposes and therefore the space taken up by this hint may not be wasted.

A Starting Device.

From Marc Kean, Kentucky—I wish to lay before you a device that I am installing on a single cylinder Reo runabout, to enable me to start the motor without exhausting myself in cranking it.

This arrangement will do the work and I have merely to pull the plunger up halfway and suddenly push it down, this sends in a spray of about two teaspoonsful right into the explosion chamber and the very first pull of the crank starts the engine. I could



Mr. Kean's Starting Device.

have connected this to the pipe that leads from the carburetor to the motor, but before the mixture would reach the explosion chamber it would have to pass the intake valve, so I thought it would not be so effective. In the sketch shown, A, is the pump, about 6 inches long and 1 inch in diameter; B, is the gasoline feed connection from the tank; C, is the carburetor;

D, is the pump or priming attachment, with a 3-32 hole into the explosion chamber; E, is the spark plug; F, is the check valve on the feed line.

I want you to criticise the disadvantages, should any occur to you; the advantages I am familiar with. The pipe will of course always have some gasoline in it but it is tight and only $\frac{1}{8}$ inch pipe size, and I cannot imagine how the arrangement could in any way give trouble but I submit it to you for criticism.

Reply.—The particular disadvantage from your device, it seems to us, lies in the fact that there might be a liability of "flooding" your motor with gasoline, or possibly with water, should any of the latter accumulate in the bottom of the float bowl. We should prefer to take the gasoline from a tee in the gasoline piping through an adjustable $\frac{1}{8}$ inch needle valve between the first check valve and the pump, so that the pump piston could be withdrawn its full length which would fill the cylinder with gasoline vapor and some gasoline, and then on depressing, there would be a much more finely divided mixture enter the cylinder if the orifice of the opening were smaller. Spring seated vertical check valves are preferable to horizontal patterns.

REPAINTING THE CAR.

Practical Suggestions for Successful Work by the Intelligent Amateur.

BY NEMO.

Sometime since, in the columns of this magazine there appeared an article in which the correspondent in the most optimistic manner advised the individual car owner to repaint his car, sounding the praises of such a proceeding and stating that one or two concerns were selling outfits that would make the job exceedingly simple and easy. Later, another writer took occasion to criticize, and in the most gloomy and pessimistic tone warned anyone from attempting such an unheard of proceeding, stating that the results would be most disastrous and unsightly. In this as well as many other things, the real facts are probably between the two extremes, that while the amateur cannot finish his car to look like a \$5,000 machine, yet some labor expended will cause such a vast improvement that it is well worth while. It is not only the machine with the poor finish or paint in bad condition that can be benefitted, but some that were made two or three years ago and finished in such loud and "screamy" colors that they are very much out of place with the present tendency toward quiet and harmonious effects.

In the present article, the writer will endeavor to tell a few things that might be helpful to any one contemplating making a change for the better in the exterior appearance of his machine. The writer will at the start earnestly disclaim any pretension whatever to being a painter. He is a machinist with an experience running back to the palmy days of the bicycle when he conducted an establishment for the selling of new wheels and the repairing of disabled ones. Later when the automobile sprang into prominence, he stepped into the garage business and has had a long and varied experience with all points of the game.

As agent for a popular make of car, he is compelled to do some trading, taking old machines as part payment for new, and before putting the old on the market, usually repaints and refinishes them. In this, however, some care must be taken, that the labor and expense of doing this work is not too great, or the added value will

not be proportionate to the expense. Nothing is so fatal to the successful sale of an old machine as a poorly smeared and daubed surface where a careless and ignorant owner has attempted to thus improve it. Therefore, it must be certain that the change will be an improvement, or the selling value of the machine will be greatly reduced.

This establishes a parallel between the writer and the individual car owner. The individual cannot put on fifteen or twenty coats of paint and varnish as is done on new machines and at the same time he must be sure that the job is neat and presentable when completed, or it will be far better to leave car in its present condition.

The necessary qualifications on the part of the operator for a successful job are intelligence, patience and willingness to expend some muscle. That the reader of these lines is intelligent is proven by the fact that he is a subscriber to *The Automobile Dealer and Repairer*, and we are quite certain that by the same token he has the two other mentioned qualities.

Let the writer most emphatically state that he is not attempting to outline a course for professional painters, but only to point out and call attention to a few things that the average car owner who wishes to improve the appearance of his machine, perhaps has not had any opportunities to learn.

Unless the original paint is in very bad condition, the writer would advise to not remove it, not only because the amateur will have considerable trouble in doing a thorough job of it, but also it will add greatly to his labor in putting on a number of extra coats to take the place of those removed.

If necessary to remove the original paint it can be done either by one of the chemical solvents made for the purpose, or by heating the paint with a gasoline blow torch and scraping off the softened paint with a putty knife. The torch will be a much more economical and rapid agent than the solvent, but some care must be taken when using it near the leather upholstery on account of the great heat generated. Leather is very easily burnt. Also when using the torch on a metal body, do not hold it too long on one spot, as from the heat the metal will expand and bulge and if continued until the metal becomes red hot, there is danger that the bulge will remain after the surface cools.

The writer would therefore recommend that the body paint be undisturbed, but the hood is usually badly scratched and marred from being lifted on and off so much, thrown about on the floor and getting other hard usage. From its straight lines and level surface it is a short job to burn off the damaged paint and the vastly improved appearance will justify the little extra time and labor required. Also the front fenders sometimes should get the same treatment, they are usually damaged by the removal of the hood as well as by the customary habit of throwing tools and extras when working with the engine and machinery.

Any dents in the surface of the hood and fenders should be removed as much as possible before commencing to paint. Dents show very plainly on a newly painted surface, while they would be unnoticed with the old paint.

Do not attempt to remove dents with a block of metal and hammer, as the hammer will probably stretch the metal so much that it will look worse than before, but take a block of hard wood and a wooden mallet with a slightly rounded face. Small deep dents can be very thoroughly hidden by scraping off the old paint until the surface is bright and smooth and then filling with

solder, afterward filing and scraping off the surplus until level with surface.

The room should have plenty of light and if necessary to have car standing so that a draft of air strikes it every time a door is opened, arrange some sort of a screen to partly protect it from the dust that is sure to be raised. Sprinkle the floor with water around machine before beginning each coat, or sweep it with broom wet with kerosene.

Where space permits, it is best to remove body of car from chassis and set it on trestles or boxes. This will give every facility for painting running gear and frame and enables body work to be done in a great deal less time and a much more satisfactory job in every way. With a putty knife and stiff wire brush remove as much as possible of dirt and grease by mechanical means from wheels and axles, remembering that every greasy spot will keep the paint and varnish from drying. After getting most of the dirt and grease by these means, use a handful of cotton waste saturated with kerosene to remove balance, afterwards drying surface with waste and finish preparation by washing with soap and water.

Usually two color coats and one or two of varnish are sufficient on running gear. As these parts are mostly hidden by the fenders and body, the painter whose time is limited, can spend less time there than with the body without materially neglecting the appearance. The wheels are painted much faster and better when removed from axle and the writer has found that the time taken to dismount them is gained many times over by the greater facility in doing the work, when they are disconnected. Select some quiet, neutral color for these parts, that does not easily show dust, grease or mud. Some shade of gray is most suitable and harmonizes with almost any body color.

Remove all tire irons, horn bulb and tubing, curtain fasteners and other attachments that may be fastened or screwed to the body. You will save much time by having them out of the way and enable you to produce a much smoother surface where they attach by finishing under them instead of around.

For commencing body work, go over original paint with sand paper, or steel wool (also called mineral wool), to smooth surface. Steel wool is a very much faster cutter than sandpaper, but has the disadvantage of leaving ground-up particles, or dust of itself, in corners, out-of-the-way places, panels, etc., so great care must be taken before putting on first coat that all residue is removed, or it will be picked up by the brush and distributed over surface to the great detriment of good work. An air blast or the nozzle of a tire pump can be used to dislodge these particles, and a magnet is also very useful for getting them out of corners. Scratches that are too shallow to putty up, but deep enough to injure the looks of the job should be given special attention and removed as well as can be done.

After smoothing, go over body with damp cloth to remove particles of dust. When thoroughly dry, apply first coat of paint as thinly as possible. See that paint is not too thick in consistency or it will not brush out smoothly or dry well. And now comes the first opportunity to exercise patience. The ambitious amateur, in his eagerness to see "how it will look," can scarcely wait until next day before attempting to rub down first coat, with the result that the surface rolls up, gets rough and gives him regrets that he ever attempted the job. Remember that paint sets quickly and while it is apparently dry on surface, it is far from hard or dry underneath. So wait until you are absolutely sure that it is

dry and hard and then for good measure wait a few days more. A little ingenuity expended in timing the different operations will help the time to pass better. Paint the body first, and while it is drying go over the running gear and frame.

When paint is thoroughly dry and hard, attack it with a rubber made of cheesecloth in a long strip, rolled up into a cylinder and of a diameter so that it can be easily held in the hand. Tie a string around it so it will not unroll. Dip it in water first, then in a tray or shallow box containing powdered pumicestone and go over surface until paint is smooth and free from lumps and small particles. Be careful not to press too hard, it working best with some speed and light pressure, rather than slow motion and great pressure. And here the writer will state that if the brush sheds bristles during the painting, do not leave them, but remove with the point of a knife as soon as they are deposited. If left, a small ridge will form on each side of the bristle which will cause great trouble to remove subsequently. After rubbing, clean surface with a damp cloth and after it is thoroughly dry give it another coat of paint. When in condition to rub, go over it as before and give it same treatment as for first coat, repeating painting and rubbing until enough coats have been put on to give uniform color, depth and smoothness of surface. At least two coats are absolutely necessary, three are better for good results. Before leaving this part of the performance it might be well to say that any deep dents or holes should be filled with putty between the first and second coats. If done before the application of the first coat, the putty will not stick to the raw wood, for which reason great care should be taken that the bottom of cavities should be well filled and covered with paint. If done after second coat, not enough color will get over putty to make it uniform with the surrounding surface.

Between coats, be sure that can containing paint is tightly covered, not only to keep out dust and impurities, but to prevent the formation of a skin over surface of paint in can. If this film is allowed to form, be careful to gently skim it off before stirring paint or it will be broken up into numerous small particles which will make it nearly impossible to get a smooth coat without straining paint.

After each coat, it is best to wash out brushes thoroughly, first with gasoline and then with soap and water, to keep them from drying and hardening. If they are set in water as is sometimes done, it has a tendency to chill and harden the paint left in brush, forming small lumps and particles which will not have a good effect on smoothness of surface of next coat. They may also be put in a can of linseed oil, in which case clean oil from bristles with turpentine before using next time.

When applying the varnish, be sure that room is warm, otherwise it will be difficult to spread the varnish properly. Also spread it quite thinly, otherwise it will not dry well. Work as fast as good, smooth work will permit and brush surface well so no ridges or high spots will show. Varnish sets very quickly, so it is important to use as much speed as is consistent with good work. When one spot is completed and a new place is attacked, be sure that where the newly covered patch overlaps that just finished, that the varnish be very thinly applied and spread out thoroughly, or a rough, uneven surface will be the result. Varnish does not, like gasoline, spread itself in a thin, uniform coat over the surface, therefore use every precaution to level it when applied.

Be sure that varnish is absolutely dry and hard before rubbing it down, or it will roll up and get rough. Use

the same system for rubbing as for the preceding coats of paint.

The writer would advise the amateur not to strive for a high gloss effect. This requires great skill and experience, very favorable conditions for working and is beyond attainment of one not skilled in the work. It is better to get a smooth, velvety surface, which can be reached by anyone with a little effort. Two coats of varnish are the very least that should be considered, three are very much better, and if time and energy permits, put on four. For rubbing the last coat, instead of water and pumice, use linseed oil and pumice and you will get a lovely satin finish. The high gloss, even if possible to secure by the beginner, is not lasting. After the body has been spattered with mud and washed off a few times, and been dusted off after several runs, it soon loses the piano finish. Therefore it is not necessary or desirable to attempt to secure it.

After finishing last coat, wash with cold, soft water and a chamois skin. Dry thoroughly with cheesecloth and apply some one of the several most excellent body polishes now on the market to complete the job.

If the owner thinks that some variety of color on the body is desirable the writer would most earnestly and emphatically advise him not to attempt any striping or scroll-work. Unless done in the most expert manner, it will prove ruinous to the neat looks and spoil the good effect of the many hours of labor. If it is thought best to have a little relief and variety of color, the door and seat panels may be given a little different shade from body, with most excellent and pleasing results, and no danger of ruining the preceding work. Very many of the best machines of the present day have very little, if any striping. The tendency is toward quiet effect, so no regret need be felt by the amateur in omitting so-called ornamentation. If the panels are so treated, it should be done before the first coat of varnish, so all the paint will be equally protected by the same finish as the rest of body.

Now as to materials. It is very poor economy to use cheap brushes. The coarse, stiff bristles used in them produce a very poor, uneven surface and make it nearly impossible to lay the paint on smoothly, besides which, the bristles have the obnoxious habit of coming out of the brush and decorating the surface in a manner to make a saint use profane language. Therefore, use the very best brushes obtainable.

Also, avoid cheap paint. The labor of applying poor paint is not only as great but actually greater than that of good material, and the results, not only of the present appearance, but the future durability, fully justifies the use of the best. Any one of the standard paints put out by long established concerns that have built up a reputation in the past for excellence of product, will give good results.

The writer prefers to use the ready mixed paint prepared for use on carriages, buggies, etc. It contains a large proportion of varnish that makes a hard, durable surface. If the reader is in doubt of what shade to use, let dark blue be recommended. It always looks well, is always in fashion and will be as appropriate next year as this season.

In conclusion, be neat, industrious and careful and the results will be most pleasing.

The Cause of a Sluggish Engine.

A little incident which occurred in connection with the driving of a car may be interesting to other men who occasionally have troubles. It was found when driving the car that the engine was getting rather sluggish, and

although the water circulating system was in good order the engine seemed to be warming up to an undesirable temperature. The driver opened the throttle suddenly to see how the engine pulled and it was then obvious that it was getting too much gasoline. He therefore had a look at the carburetor and on examination found that the air valve had become stuck, this being caused by a deposit of dirt, which would not let the valve lift. As he had a little time to spare, the driver took out the valve and thoroughly cleaned its seating and guide and after grinding the valve in and cleaning it thoroughly he was able to proceed on his journey again without any overheating and sluggishness. Little instances of this sort frequently spoil the pleasure of a car ride so that it may be worth while mentioning how simple and easily trouble of this nature can be overcome.

A Low Priced Business Looking Truck.

Illustrated herewith will be found the model H Reo truck, which sells for \$750 and looks substantial and of easy up-keep. The specifications follow:

Color—Body, dark green; running gear, red.

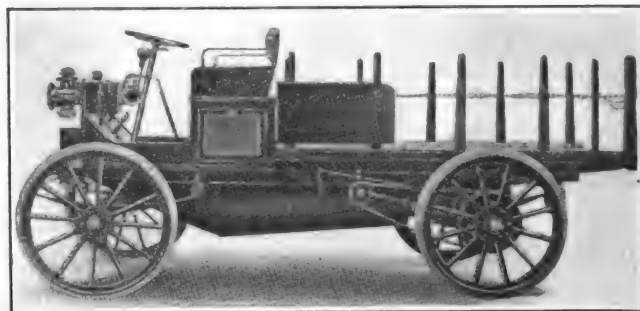
Carrying Capacity—1,500 pounds.

Clutch—Multiple disc.

Wheel Base—90 inches.

Gauge—56 inches.

Tire Dimensions—Front, 36x2 inches; rear, 36x2½ inches.



Reo Truck for \$750.

Brake Systems—Contracting on rear wheels and jack-shaft.

Horsepower—(A.L.A.M. rating), 9.

Cylinders—One.

Arranged—Horizontally under seat.

Bore—4¾ inches.

Stroke—6 inches.

Cooling—Water.

Radiator—Tubular.

Ignition—Jump spark.

Electric Source—Dry batteries.

Drive—Double side chain.

Transmission—Planetary.

Gear Changes—Two forward, one reverse.

How to Get Good Service.

An automobile that has been intelligently driven and cared for will render better service the second season of its career than during the first. The various parts of the running gear have smoothed out all their wrinkles and become synchronized; weaknesses will have made themselves known and been corrected or adjusted. If care has been taken that the engine has not been overheated, if the mechanism throughout has been kept perfectly clean, and the driver generous with lubricating oil, there are few parts of the engine which will show appreciable wear during the first season. An ordinary

overhauling will serve to put the motor into perfect trim for its second year.

In the estimation of insurance companies, a car will depreciate in value from one-quarter to one-third each year that it is in use. Depreciation is here figured on a selling value. In practice, this method of reckoning is too arbitrary. The actual service value of the car does not, in reality, depreciate more than a fraction of the original cost if it has fair treatment.

To quote the words of one of the oldest men in the business of overhauling, rejuvenating and selling old models, "an automobile never wears out if it is treated right." To treat it right, it must be looked after by capable mechanics who see that wornout parts are replaced in time to save the rest of the machinery. The greater part of the expense is in getting at the parts, and this is steadily being reduced by better arrangements and by increasing the durability of the wearing surfaces. Transmission gears should be replaced once in from 30,000 to 50,000 miles. The gear shafts probably run in ball or roller bearings, which outlast the gears and are more easily replaced. Propeller shaft, joints, axle bearings, brake linings, all last from one to three or four seasons, and in none does anything have to be replaced except the worn-out parts.

Most cars built today become superannuated, because of the little difficulties which, if attended to at once, involve only a trifling expense. Many owners of old cars complain of the noise these veterans make. It is true, in comparison to the purring new machines of the latest output, the two and three-year-old models seem noisy, but they can be made to soften their tone, if the soot be cleared from the cylinders and the various cups, joints, and bearings are carefully and conscientiously oiled. That the steering gear wobbles on its pivot bolt, the crank pins are loose on the connecting rod, and the cardan joints of the propeller shaft are worn, by no means indicates that the car is ready for the junk heap.

Parts like the above mentioned will require tightening and adjusting. Leaking radiators and loose brakes, though sometimes serious enough to lay up a car, are matters of small expense to put into shape again. In too many instances the depreciation of a motor car, as well as the high cost of its maintenance, are due to the employment not only of inexperienced chauffeurs, but also dishonest ones. The matter of padded expense bills for extra parts and of the chauffeurs' rake-off from the repair shop is too old to be taken into consideration here. The bill for maintenance and for repairs will diminish as soon as the owner becomes acquainted with his car sufficiently well to know what it needs, so as to be able to issue minute instructions regarding the work he requires. This can be easily proved by any who will try it. Then, too, there is joy in the knowledge on an owner's part that he knows the mechanical structure of his machine.

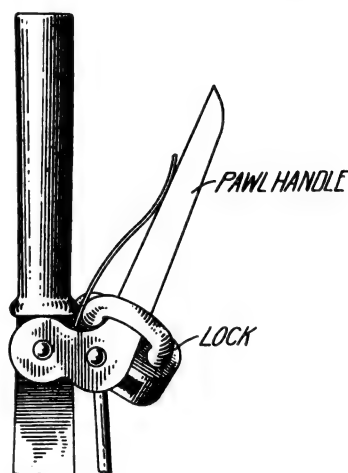
A Quickly Detachable Terminal.

A useful device is a quickly detachable terminal suitable for attaching to the spark plug and this can be very easily made in the following manner. First of all a piece of copper tube should be obtained, having a bore of the same size as the outside diameter of the wire for which the terminal is required. About an inch of the insulation should then be taken off one end of the wire so as to make it bare and this end is then fitted into the tubing, one end of which must be flattened out. This can be done by using a hammer and a piece of flat steel and resting the tube upon it. A hole should then be drilled through the center of the flat piece after which

a piece is filed out of one side and the other part rounded off with a file. By soldering the wire into the terminal a better job can be made of it and the round part is used for slipping over the plug. The whole affair is easily detachable and will be found to be of very great advantage especially for touring purposes where time is not to be wasted in fiddling about with small bits and loops of wire, which are so apt to break and cause trouble.

A Lock for Cars.

From E. J. McCall, New Jersey.—This article especially refers to a 1912 Model T Ford touring car, but is applicable to other models. It is necessary at times to lock one's car and this can be done very easily. Buy a lock as shown at a cost of 50 cents. On opening this lock the hasp lifts up and then swings to one side. To lock the car pull the hand brake lever all the way back. This puts on the emergency brake. Slip the hasp



The Locked Car.

of the lock through between the flat spring and the handle which lifts the pawl and snap the lock. This will prevent the handle closing and keep the pawl in the toothed rack so that the hand brake lever cannot be moved. It will probably be necessary to file the hasp a trifle at the end which slips under the flat spring. Insert the lock so that the keyhole points towards the right side of the car as this makes it more convenient to unlock. This makes it difficult to steal the car by towing it away, which the switch key would not prevent.

Cleaning the Radiator.

Rain water is best for use in the radiator because it is soft and pure. Hard water has a tendency to form a fur or fuzz in the cooling system. This and the solids deposited in the radiator and piping are sometimes difficult to remove and if there be any interference with the circulation of the cooling water, overheating is apt to result. In the early stages, that is, when there is little deposit or fur, a strong solution of washing soda is sufficient to effect a cure. Dissolve 1 lb. of soda in two gallons of hot water, fill up the radiator, start the engine, and let the solution circulate for ten minutes or so. Drain off, fill up the radiator with pure clean water, or open the tap at the bottom of the radiator, and, letting water from the hose run in at the top, keep the engine running to get rid of the last traces of the alkali.

When furring has reached an advanced stage, however, the above treatment is worse than useless, and stronger measures have to be adopted. With the acid treatment it is not necessary to remove the radiator,

which is one point in its favor. Prepare a solution of hydrochloric acid in the proportion of one part acid to fifteen-twenty parts of water. Fill up the radiator with this solution and start the engine, so keeping the solution circulating for about five minutes, then drain off.

Have ready the washing soda solution mentioned above, let this circulate for a minute or so in order to neutralize the acid remaining in the water system, then drain off and flush thoroughly with water. This process may be repeated if necessary, and usually results in the complete removal of the solid deposits.

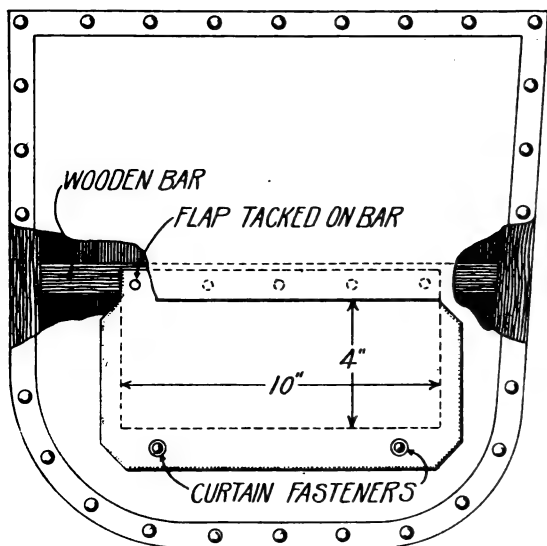
For the strong alkali method it is necessary to procure $\frac{1}{2}$ to $\frac{3}{4}$ lb. of caustic soda (take great care in handling this) and dissolve it in two to three gallons of water. Unship the radiator and set it outside the garage to drain. Then fill it up with gasoline, blocking up the outlet so that none may escape, put on the radiator cap and set it aside for six to twelve hours. The gasoline serves a double purpose, it dissolves any grease which may be in the tubes and also loosens the fur deposit to a limited degree.

After standing for the time mentioned, drain off the gasoline, strain and set it aside for future use. Then, after putting the radiator in place on the car again, fill it up with the caustic soda solution and allow this to circulate for half an hour or so. Then wash the system thoroughly with fresh water.

Either of the latter methods will remove the most obstinate furring, but the following are points to be noted. Wooden pails should be used for making solutions. The operator should dress for the part, that is, use old clothes and gloves, and should avoid splashing the solutions on engine or coachwork. Rubber and caustic soda do not agree, so new rubber connections should be ready. A repetition of the trouble should be avoided by using only rain water in future.

Handy Pocket in the Door.

From E. J. McCall.—On the foredoor model of the Ford touring car the door beside the driver is a "blind" one. That is, it does not open. Half way down on the



Handy Pocket in the Door.

inside there is a wooden bar running across under the leather. Cut a horizontal slot in the leather, about ten inches wide immediately below the bar. Pull the leather away from the cardboard and cut down the cardboard about four inches. Cut the leather so the edges can be turned in over the cardboard and gum them down and you have an opening about ten by four inches into which

maps can be slipped. Get a piece of leather cloth larger than the opening, turn over the edges and stitch on a machine. Tack this flap on the wood bar running under the leather and you have a flap to cover the opening. Use two curtain fasteners to keep the flap shut.

Difficulty With an Engine in Starting.

An incident in connection with a motor car engine may be mentioned, inasmuch as although it does not present anything very extraordinary in the way of technical difficulty, it serves to illustrate a type of trouble which has more than once led to very serious accidents and in some cases to loss of life. Too much emphasis cannot be laid on the fact that when starting up a car by cranking the engine, it should be carefully ascertained that the engine is free to run independently of the driving mechanism or in other words, that the car is properly out of gear.

On one occasion the car had been got ready at the garage for a gentleman who was to drive it, this car being of small power and used for runabout purposes by the owner, who although taking a keen interest in motoring had no very great technical information concerning the actual working of a car. He did not go very far before he had to stop at a place on business, and on coming out again to start the engine, he found that he could not pull the starting handle round in spite of considerable effort. So far as he could see, everything was in proper order ready to start, and so after trying for a considerable time he came back to the garage and asked one of the attendants to try to start up for him. When the attendant arrived at the spot where the car was stopped he found that the ignition and the carburetor were in good order. He then took hold of the engine handle and gave it a sharp pull, and then found that the car worked forward as soon as the engine turned. He got out of the way pretty sharply, but fortunately the car did not continue its motion, and the attendant arrived at the obvious conclusion that the car was not properly out of gear, although the lever was in its proper notch. After putting the lever into its neutral position and giving the starting handle a turn he was able to start the engine without further trouble and to drive the car home.

The incident is one of the simplest, but it demonstrates the important fact mentioned above, that trouble is very frequently caused by the car being in gear and on the engine being started, moving before the man at the starting lever can get out of the way. As many accidents have been due to this cause it is worth while emphasizing the point that before starting the engine it should be carefully observed that the car is actually out of gear.

To Add to Tire Wear.

It should be carefully borne in mind that whatever adds to the durability of the tire must to a certain extent likewise decrease its resiliency, and likewise, by adding to its weight, somewhat add to the power necessary for the propulsion of the car. It must not be assumed from this that inner or outer casings or non-slipping devices are not an economy or are thus undesirable. The reverse is true. But those using such devices should take the facts as stated into consideration, always bearing in mind that the extra amount of gasoline required or even the slight allowance to be made for just a bit less comfort to the car occupant—which, by the way, may not be noticeable—is a mere bagatelle compared to the saving in tire expense.

As a further means of tire economy, the utilization

of old casings has proved decidedly advantageous. This is often done as follows: When the tires become so worn that new ones are imperative, buy two new ones for the rear wheels only. Then from the four old ones, select the two that are most worn. Then with a sharp knife, cut the bead from one side of the old casing, allowing the better one to remain on. With a punch make two holes two inches apart and one inch from the edge from which the bead has been removed, in six places around the casing.

With a stout galvanized iron wire make six V-shaped wire staples, with points four inches long and two inches apart. In a vise twist the bow ends one and one-half times around, and bend the points to a right angle, corresponding to the plane of the eyes, with a one inch projection. Then deflate the tire, and holding the protector with the bead edge down, crowd it over the wheel so that it will occupy a position around the axle between the spring-seat and the wheel, with the beadless edge toward the wheel.

Then pry the protector a few inches at a time over the deflated tire until it is evenly in place all around the wheel. Insert the points of the wire staples from inside outwardly through the holes made in the protector, and bead them down so as to make retaining hooks.

Through the wire eyes, which project toward the hub, run a piece of wire around, and make a loop in each end of the wire so that they will be about eight inches apart. With a small strap and buckle inserted in these loops draw the retaining wire tight, and inflate the tire.

This gives an almost puncture-proof tire, and one that will withstand nearly as much general road wear as a new one. The fit is exact and little dirt or water can get in but it may be further improved by cementing the protector to the casing.

The longer size of the front tires by the use of the protector insures a path through which the rear tires may travel with but very little side wear. Owing to a less resiliency of the tire beneath the protector in ordinary use less friction and heat are developed than in an unprotected tire.

Defective Floats.

When flooding of the carburetor occurs in the course of continued regular use, it is often due to a defective float. The floats now largely used are made of very thin metal stampings, and as the gasoline has some slight chemical action on copper and brass, pinholes will occasionally develop in the float and admit the spirit to the interior, thereby reducing its buoyancy and causing it to maintain a higher level in the float chamber. Gasoline is an extremely light fluid, and will gradually ooze through an opening far too small to be detected by the naked eye. The best way to determine whether the float leaks, therefore, is to take it out and shake it, and observe whether there is any noise of splashing gasoline produced. An even more common cause of leaks in floats than punctures of the metal wall is the opening up of the soldered joint between the two parts. A leaky float containing gasoline is rather difficult to deal with, and the best thing to do is often, in such a case, to get a new one.

An estimate of the number of tires manufactured in this country in the past five years is made by R. R. Drake, manager of the service department of the United States Tire Company, who puts the total at 8,000,000.



This department is intended as a "trouble clearing house" for car owners, dealers and repairmen. Inquiries in relation to marine motors will likewise be answered, as they are of interest to car owners and others who use the two-stroke cycle engine.

Readers are requested to make criticism and comments or to freely discuss any subject of interest to the automobile industry, and to add information of their own experience in remedying troubles.

Inquirers are asked to give the fullest information in every case so that replies may be made intelligently, and thus be of interest not only to the inquirer but to others

835 Magneto and Coil Wiring.

From D. A. Jamison, S. Dakota.—Why are there three primary wires from the Remy type S magneto to the coil—yellow, red and green—and what is each used for? If the spark control lever is changed to the left side of the breaker box should the red wire from the primary winding of the magneto be changed to the insulated terminal on the breaker box or left side when facing this end of the magneto?

Reply.—The primary circuit is established through the red wire which runs from the collector ring insulated binding post to the switch, then through the switch, in its "magneto" position to the coil and to the interrupter contact terminal through the yellow wire. The green wire is to a "ground" connection to short circuit the magnetic current when the switch is in the "off" or battery position. The wires should be connected to the same colored binding posts, no matter what the direction of rotation. To change the direction of rotation, turn the segment over.

836 Brake Cleaning and Warm Air.

From G. E. Lawrence, Massachusetts.—1.—What method would you advise to thoroughly clean an oil soaked brake lining (I do not know what the lining is composed of)?

2.—In driving a gasoline car in cold weather the carburetor of which has no water jacket or other heating device—if dry warm air were made to enter air intake of the carburetor—instead of cold air, would the same power be obtained with less consumption of gasoline?

Reply.—If of fibre, or asbestos and wire, use ordinary whiting. If of leather we should not advise anything except soap and water. Kerosene or gasoline might have a tendency to burn the leather, which if not already ruined would be quite likely to be ruined. Mineral gas engine cylinder oil should never be used on leather.

2.—You might get more power on less gasoline and again you might secure less. The probability is that your gasoline consumption would be reduced. If you do connect a hot air lead to your carburetor, be sure and arrange to allow cold air to enter in case it is needed, using a shutter with means for adjusting the amount of either hot or cold air to get the best results. Have this shutter as near the carburetor as possible.

837 Connecting to the Carburetor.

From Louise G. Spies, Illinois.—With my double opposed Beaver motor I have about the same trouble

as No. 781 of the February issue. Your reply is to use air, heated by the exhaust, conducted to the carburetor intake. Will you please tell me how to connect this to the carburetor and how large a pipe to use for this? Is this to be tapped in to the exhaust pipe? My carburetor is a Schebler Model D. I had my motor all apart and cleaned it, ground the valves and went over all parts and now it is hard to start, and when I crank it blows a vapor out of the air intake of the carburetor but as soon as the motor runs it doesn't do that but I can't adjust my carburetor right. The engine will either race or stop. I had all parts and gears marked so I got them together same as they were. Do you think it possible that I haven't got the valves timed right? But I marked the gears and got them in the same as they were in before. The gear on the cam shaft has a mark and the fly wheel has one. The two marks are supposed to correspond, are they not?

Reply.—Have a sheet iron sleeve made that will surround the exhaust pipe at some convenient place with spacers to keep it about $\frac{1}{2}$ inch away from the exhaust pipe. Lead a 2-inch tin or galvanized iron leader from an extension on one side of the sleeve to the air horn on the carburetor, reducing its size so as to fit rather snugly over it. In the leader close to where the size is reduced cut say four $\frac{3}{4}$ -inch round ports, and have a sleeve fitting over these so you can adjust the size of these openings by covering them to get best results. If there is any blow back through the carburetor, it shows one of three things, the timing is wrong, there is a leak past the inlet valve or else the valve stem is sticking in the guide. If there is a blow back on both valves it would seem to indicate the first of the three. If one only blows back, either one of the last two. Ordinarily the marks on the gears should correspond. To adjust your carburetor, screw the adjusting spring screw down hard and adjust the gasoline to run the motor slow with the throttle nearly closed. Then as the throttle is gradually opened relieve the tension on the automatic valve, until the motor runs satisfactorily at high speed. Do not touch the gasoline needle valve after you have made the low speed adjustment.

838 Double Opposed Motors.

From Horace Huber, Indiana.—I have a two cylinder De Tangle machine, opposed water cooled, 1910 model, that has given me trouble all winter. The spark is good, both on batteries and magneto, the gasoline pipes clear, carburetor (Schebler D) is clear and apparently in first class condition. The manifold pipes are good and tight and the compression fairly good. I can hardly start the engine at all unless I close the butterfly in the carburetor. Even then it starts hard. The motor runs fairly good but when you throttle it down and then advance the levers rapidly, one cylinder will shoot alone for several shots, then there will be a back fire through the carburetor and then they will both pick speed up immediately. On the road the back shot through the carburetor is more noticeable. When the motor runs slow it is very weak but as it slowly picks up speed it apparently increases in power. Now I have tried every way to remedy that back shot through the carburetor but cannot locate it. The car has just been overhauled and that has helped it none. Everything is tight and in good shape.

I have watched your trouble department and have thought that probably it is the carburetor. What carburetor would you advise me to use if that is the

trouble? How would you recommend the Marvel carburetor, made at Indianapolis?

The trouble you describe is one often experienced with double-opposed motors, unless they have hot air supply to the carburetor. With compression as you describe it "fairly good," do not look for perfectly satisfactory operation until you get good compression. It is no way to run any motor, to throttle it down and then open the throttle wide and advance the spark. You surely would not open a steam engine throttle in that manner, but slowly, nor would you think of starting an electric motor by throwing the starting lever hard over. When your motor is running slowly the gasoline does not entirely vaporize, and some of it accumulates in the inlet manifold, and if you open the throttle wide that condensed gasoline will "flood" one or both cylinders. The very best and most expensive carburetor ever designed and manufactured will no more stand abuse than will the one you are using. You cannot expect a carburetor to improve your compression, which will have to be improved to make starting easier, especially in cold weather and with the present grade of hard vaporizing gasoline that is being dispensed by the refiners and dealers. We should advise you to keep your present carburetor and either buy another motor or have the loss of compression remedied. The Marvel carburetor is an excellent design and an efficient device, but it will not perform miracles. Double-opposed motors are little used at present, owing to carburetor troubles that are structural and that may be expected in their operation. It is almost impossible in double-opposed motors to get the right mixture in both cylinders. One will be too rich and the other too poor. The "back-fire" comes usually from the cylinder with the too poor a mixture, and the missing from too much gasoline.

839

Valve Timing.

From a Reader, Indiana.—I have a double cylinder opposed type, $4\frac{3}{4}$ -inch bore by 4-inch stroke, four-cycle, air-cooled motor. On examining the timing of the valves I find that the intake opens after the exhaust valve is closed, which closes when the crank is on center but the intake valve is not closed until the piston comes back on the compression stroke about one inch. Should this valve not close sooner? It works the same on both cylinders. On examining the cams I find that the cams operating the exhaust and intake valves are both alike while on other make motors the intake cam comes more to a point than the exhaust. Do you think that I could increase the power by getting a different cam or by grinding it on an emery wheel so as to allow the intake valve to close sooner? The compression is good in both cylinders and the cams show but little signs of wear. The motor also has a $\frac{3}{8}$ -inch pipe tapped into the crank case to allow the air to circulate through as the pistons move. Would a valve, if placed on this pipe to keep the compression in the crank case, be of any value to this motor?

Reply.—The intake valves should close very much earlier than they apparently do in your motor. We hardly think you can correct the timing by grinding the inlet valve cams on an emery wheel, for they are probably case-hardened and you would soon grind through the thin hardened part of the metal. Your motor is probably several years old, and we fear your only remedy is to have new cam shafts made, unless the manufacturers can furnish you with some new ones of more modern design. Do not place a valve on the "breather"

pipe to the crank case, unless you want the oil forced out of your crank case and the bearings burned out. Its mission is to allow of the escape to the atmosphere of hot gases that may get past the rings, and to cool the interior by means of the air circulation. It would not be of any value to get compression in the crank case of any four-stroke-cycle motor, but a positive detriment.

840

Starting and Polishing.

From E. S. Bolland, South Dakota.—I—I have been running a Maxwell Model "Q" car the past two seasons which is equipped with a Maxwell carburetor. The first season that I used this machine it would start off at the first touch of the crank without priming the carburetor even if it had been standing idle a whole day, but last summer I had to prime it after a few minutes' stop, no matter whether the weather was warm or cold. What is wrong? Have been unable to discover any leaks.

2—Is Liquid Veneer of any value in renewing or keeping fresh the paint and varnish on the car?

Reply.—It is very likely that the heavier and consequently harder-to-vaporize gasoline is responsible for your hard starting, although a slight increase in the fuel opening and decrease in the automatic air valve adjustment would give you a richer mixture at slow speed, as when the motor is slowed until it stops. Increasing the amount of fuel would necessitate more air at high speed, hence the decreased resistance to furnish it. All carburetors should be adjusted for low speed first, usually by means of the needle valve, the high speed adjustment being made solely by adjustment of the tension of the automatic air valve spring, or auxiliary air valve opening.

2—Liquid Veneer is a good cleanser of the paint and varnish, but we fancy it will not be claimed for it that it will renew them.

841 Valve Grinding and Carburetor Trouble.

From H. R. Combs, Missouri.—I—In grinding a valve recently the seating surface of the valve became covered with very slight concentric ridges. These ridges are scarcely perceptible, but seem to be of sufficient depth as to prevent the valve from seating properly as it will not hold compression. What caused the surface of this valve to become cut up this way in ridges while the other ones ground perfectly smooth, all being ground with the same material—"Whiz" Valve Grinding Compound? How can I get the seating surface of this valve ground smooth again?

2—In regard to the double jet carburetor used as standard equipment on Model T 1911 Mitchell cars: Gasoline drips from the carburetor at the base at the fixed air opening. This dripping is continuous. The level of the gasoline has been lowered several times, and the float valve has been ground to its seat by a competent mechanic, all of which seemed not to stop the dripping. What is the cause of this? How can it be remedied? Is it possible that there is a capillary attraction set up in the opening at the needle valve that causes the gasoline to overflow? A strange thing about this—to me—is that the carburetor was taken off of the machine and set perfectly level on a work bench, and with connection made to a gasoline tank, the gasoline level was adjusted so that the dripping ceased. But the moment it was placed on the motor and connected with the gasoline tank the dripping began again. How low can the level of the gasoline in the carburetor be lowered and the carburetor still work properly, with adjustments of the

needle valve, of course? What is the proper level of gasoline in the float chamber of this carburetor and how can one tell when the float is adjusted to this level? In this carburetor the float was also taken out and dried perfectly.

Reply.—There is but one correct method of grinding valves, no matter how many other methods are advised. We think more valve troubles result from incorrect valve grinding methods than from any other cause. It is not an unusual case for a valve to leak more after grinding than before the operation was attempted. In the first place breast or hand drills, or bit braces should never be employed, as they are extremely likely to cause ridges, such as you have described. The valve should never be continuously rotated on its seat, as the result will be ridges. A good substantial screw driver is the only tool needed. The valve grinding compound you mention is of a standard make. It is put up in several grades. The finish should be with the finest grade, which will usually be found sufficiently coarse for any re-grinding. To grind the valve, first smear the valve seat with the paste, which may be thinned with oil, and with the blade of the screw driver in the slot in the mushroom of the valve and the right hand securely grasping the handle with the thumb up, the left hand grasping the lower end of the valve stem, bring the valve down smartly upon the seat and rotate slightly back and forth once, lift and repeat the operation, occasionally examining the surface of the valve and valve seat to see that the abrasive material is not dry. This is the only method of securing perfect results. To cut the ridges caused by improper grinding, get some dry dirt accumulating under or on a grindstone, mix with oil and use before the final smoothing up with the fine compound. (2) The dripping of the gasoline may be caused by the float being "loaded" with gasoline; a leaky float valve; a float valve lever that does not work absolutely free in its bearings, or a float that touches some part of the interior of the float chamber. Sometimes the pin on which the float valve lever hinges becomes bent and the float "sticks" slightly. When the float was removed and dried out it should have been given a good coating of orange shellac. If the float valve leaks, a gentle tap or two on its top end will sometimes tighten it, loosening it each time before tapping it. The level of the gasoline should be just so that gasoline will not drip. The best method of setting is to connect it up with a stand pipe holding it in a vise. Draw off the gasoline, a little at a time, to get the true level, bending the lever slightly, if necessary. Let it stand a few minutes and if the float valve leaks it will begin to drip gasoline. Be sure that the float works perfectly free before the gasoline fills the bowl, depressing it and removing the depressor very carefully and slowly. Then gradually and slowly draw the gasoline from the float bowl noting whether or not the float is sensitive or drops in "jumps."

842

Vulcanizing.

From Alva H. Wyman, Indiana.—Please advise how to overcome and prevent the following difficulties. I have a Little Wonder vulcanizer and have made several attempts to patch outer casings with the same, using best grade tread stock (white and gray) and high grade cushion stock. At least that is what I paid for and ordered. After vulcanizing the solution on the patch and casing and it has dried about two hours, I apply the vulcanizer and heat to 250 to 275 degrees for thirty minutes. When removed, the patch looks perfect but a close examination shows that the outer surface is

porous just like a sponge. Please give instructions how to put on a patch that will be perfect.

Reply.—We have never heard of the Little Wonder vulcanizer although there is one called the Little Giant. You do not state whether your vulcanizer is steam, electricity, gasoline or gas. However, this does not make much difference. The heat you give seems to be about right but we are inclined to think that you are giving it too long a duration of heat. Of course this somewhat depends upon the amount of rubber that is to be heated but the usual interval is not more than fifteen minutes and possibly less. Try allowing the vulcanizer to remain about half the time and see if this will not produce better results.

843 Water with Crude Oil.

From E. E. Lewis, Oregon.—At your convenience publish an article on using water with crude oil, distillate and gasoline as a mixture in internal combustion engines. If this request is out of order, why is water used in the cylinders of distillate engines of large sizes, such as 80 h.p. Fairbanks-Morse and 25 and 45 h.p. International Harvester Co. of Chicago? I have heard this discussed to some extent and would like to be enlightened on this subject.

Reply.—Water is used in large stationary motors to prevent pounding when the ignition is advanced. The theory usually accepted is that the water, being turned to steam, gives more elasticity to the explosive mixture, the rate of flame propagation being not quite so rapid as a result. The expansion is thus rendered somewhat slower. The usual means employed for feeding water is a double carburetor, with gasoline and water constant level overflow reservoirs. Water is also used in kerosene motors to prevent accumulations of carbon, and when closing down to loosen up carbon deposits.

844 Jump Spark and Make and Break.

From F. D. J., California.—Why or why not is a make or break necessary on a low tension magneto, and also why or why not on a high tension magneto? If this cannot be answered in general, please give some make or makes.

Reply.—You may have probably noticed that some magnetos, always however low tension, are run by means of belts or frictions against the fly wheels. None of these magnetos use circuit breakers or interrupters, but in order to ignite charges of gas in motor cylinders they must have mechanical means to close and open the electrical circuit, either in the form of make or break igniters, timers, distributors or magnetic spark plugs. There is another class of magnetos run by means of sprocket chain or trains of gears at some regular proportion to the crank shaft speed, called engine-timed magnetos. These may be either high or low tension, having respectively double or single-wound armatures. If of the alternating type, there are two points in each revolution of the armature where the current intensity is the greatest, called the "peak," the circuit breaker's mission is to break the circuit as near those points as possible, thus performing the mission of the timer, distributor or other outside mechanism. Magnetos with circuit breakers give single sparks only as the circuits are broken, while with the ordinary type of magneto using a separate timer showers of sparks are produced from the time the circuit is established until it is opened, the entire time of the closed circuit period. There are systems however that produce single sparks, such for instance as the Atwater Kent Unisparker, but these usually operate on battery systems. They can also be used with friction or belt-driven magnetos.

845

A Mysterious Knock.

From E. C. Greulich, Pennsylvania.—I have a Jackson Car Model No. 41. It has a mysterious knock. This knock cannot be detected or heard while driving slow or on a grade, when the engine is laboring to any extent, but as soon as I drive at an ordinary speed on the level she starts knocking. I have taken up the connecting rod bearings as it sounds like one of those knocks, but without any effect. Might it originate or be at another place than the engine proper? I sometimes think it is not there as you can only hear it as stated.

Reply.—There are several causes of knocks such as you describe. The trouble may be from a little too much gasoline, the piston may not have quite enough bearing above the wrist pin (a very prolific cause of pounding), the upper end of the connecting rod may have a motion in line with the wrist pin, or the spark may be advanced a little further in one cylinder than in the others. The side motion to the upper end of the connecting rod would be proven by examining the crank pin bearing, as such a condition will result in the bearing being worn slightly bell-mouthed, larger at the ends than at the center.

846

No Rear Axle Truss Needed.

From C. D. Warner, New York.—Answering Mr. F. K. Marrs, North Dakota, would say that I wish to compliment him on his letter.

He is absolutely right in all he says with one exception and that is about the oil gauge. Probably Mr. Marrs would not think of running a steam boiler without a glass water gauge, but would test this occasionally with the petcocks to see that it was not clogged up. Mr. Marrs may like to get under a muddy car two or three times a day to test his oil, while others rather test the glass gauge once a week by opening the petcock in it, which will soon show whether it is clogged or not. Besides it is impossible to tell whether the oil is half way between the petcocks as it should be. I consider the glass oil gauge as important as a jack. No car for me without it. Instead of cleaning transmission with gasoline, I would suggest kerosene as less dangerous, should some fool light a match near by.

I would not approve of Mr. Carson's idea of an axle truss for the Ford. No one will ever have trouble with differential gears on account of the rear axle housing. One of the best things about a Ford car is that no truss is required; if it would, the Ford Company would put it on, and I consider the truss a nuisance.

If 794 would let the Ford Company furnish him with new connecting rods all re-babbitted for \$1 in exchange for his burned out ones and fit them properly, he would have no trouble with their getting loose. No one can re-babbitt them as well as the factory. The same is true of the center bearings.

Number 796 may find his platinum points burned through on one of his vibrators. This will cause the car to jerk on high gear. The high speed clutch probably slips, is the reason he cannot get into high.

Reply.—In relation to the clutch we think it possible that the reverse band may be dragging, being adjusted too tight, inasmuch as the owner finds it impossible to negotiate an ordinary grade. Our object in advising an overhaul was to have the clutch examined where trouble is very likely to be encountered. If vibrator contact points are burned out the motor will miss explosions, more, of course, on high than low speed.

847 **Would Be Dangerous.**

From R. V. Thomas, Tennessee.—I have a model E. Mitchell which I would like to equip with a self starter. I have a tank in which I can put carbide and water and obtain a pressure of 50 pounds, would like to know how I can use this tank and equip the car, at a small expense. This car is equipped with a Holley Carburetor which came with the car. Can I install a different carburetor and reduce the consumption of gasoline or increase the efficiency of the car?

Reply.—We advise you not to attempt to use acetylene made as you describe, for compressed acetylene is very dangerous. If you consider equipping with a self-starter our advice is to purchase some standard make. It will probably be cheaper in the end and more satisfactory. Acetylene in the hands of the inexperienced is unsafe.

You can easily equip your car with another carburetor but why not consult Holley Brothers, Detroit, Mich.? Their carburetor is a powerful device, and they would probably and truthfully tell you that economy will result from its proper adjustment.

848 **Clutch Troubles.**

From Dan Butzer, Kansas.—In your January issue I note a complaint from Mr. Robert Crickman of clutch slipping in his Buick 27, 1911. I drive a Buick 27, 1911, and tried putting kerosene in my clutch, resulting in the clutch and transmission becoming very hot on account of the clutch slipping, and was compelled to draw a portion of it out before I could get back home, being two or three miles in the country. Since that I have been using steam cylinder oil 600-w during warm weather, and use regular motor oil, same as I use in the crank case, during cold weather, as the steam cylinder oil is too heavy for cold weather, making it difficult to operate the change speed lever until the oil gets warmed up. By using oils as above stated I can stop and start on most any hillside, and am never troubled with my clutch slipping.

Reply.—A small quantity of kerosene only added to the oil will often stop a clutch slipping, while too much will act just as you have described. Our advice is to use oil in the clutch in the manner specified by the manufacturers of your car, who know what is best suited for the requirements. Experiments are sometimes expensive. The New York branch of the Buick Motor Company advise the use of Wakeley's Discovery, manufactured by the Panama Oil & Grease Co., this city, in case of trouble with clutches on this model of car.

849 **Wiring Methods.**

From C. E. Edwards, Iowa.—I would like to ask you to send me a diagram showing the proper wiring method for one four cylinder Buick car. We use a Monitor distributor and 1905 Splitdorf master vibrating coil, also batteries. Have no magneto. We fear that the wiring now may be defective as we bought the car second hand.

Reply.—The primary winding should run through the battery, switch and coil to the primary terminal on the distributor, starting from a ground on the motor. It does not matter the sequence followed as long as you start from a ground on the motor and end at the primary binding post on the distributor. The secondary wiring, which should be a special secondary cable, should run from the secondary terminal on the coil to the main secondary terminal on the distributor,

and four secondary cables from the cylinder terminals on the distributor to the spark plug. If you do not get the results expected change the two primary wires from the coil, attaching each one to the opposite terminal. It is quite likely, unless the ignition outfit has been installed new since the car was first run, that wiring will not help matters much. A coil seven years old has lasted pretty well, longer than their usual life of usefulness.

850 **How He Remedied the Oil Trouble.**

From W. C. Clark, Missouri.—I see in your issue of February that No. 799 had his troubles with a Buick No. 17 car and as I had the same trouble with my No. 19 car I will give him my experience in regard to oil in the cylinders.

After having experts from the firm and securing no relief, for the spark plug continued to be coated with oil and thus making a short circuit, I took one of my A. C. plugs and got a porcelain with a long steel point as I could. I then made an excision to the plug of about $\frac{1}{4}$ inch so that the plug extended into the cylinder far enough to escape the oil that came up on the edge of the cylinder and, of course, into the spark plug. The Buick plugs just come to the edge of the inside of the cylinder and I simply extended them further. This obviated the trouble.

I don't know how this plug would work on a car when the plug is on top of the cylinder, but where the plug enters from the side, as in the Buick car, and a cylinder gives trouble by oil getting on the spark plug and short circuits the spark, it stopped it all right for me. I call it Clark's improved plug and it may help some one who like I was in a bad fix. The oil in the cylinder of the Buick car seems to come up on the line of the piston and cylinder, and as the spark plug of most all makes extends just to the inside of the cylinder, it therefore comes in line of the oil which is thrown against it by the rapid action of the piston. When extended far inside and not in the way of the piston in most all cars there is considerable space between the cylinder head and piston or in the valves, for the compression of the gas, so I do not think it would be in the way of most other cars.

Reply.—A plug whose shell extends into the cylinder will sometimes prevent accumulations of oil and carbon, but again it is liable to become incandescent and cause pre-ignition. It should not be so long as to come in contact with the inlet valve, if positioned above it. All standard makes of plugs are made in different plug steel lengths. However, our friend's experience is interesting and instructive.

851. **Perhaps Mr. Bowman Will Reply.**

From H. V. Ruschen, South Dakota.—I own a Maxwell '03 and it acts exactly like the one described in Inquiry No. 748, from Mr. H. A. Bowman, Missouri, in your January number. I have had the magneto and coil in the Splitdorf Laboratory at Chicago for repairs, after trying everything else that could be thought of. The magneto people sent me a new coil and overhauled the magneto, but the trouble is just exactly the same as before. I have also tried the advice given Mr. Bowman but that does not help either, so if you know of anything else that might cause this intermittent "missing" I wish you would let me know what it can be, and I would also like to hear from Mr. Bowman as to how he came out with his car after following your advice.

Reply.—We have reason to believe that the trouble

is at the circuit breaker, the adjustment not being sufficiently close or the contact points fused or pitted. Try closing the gaps at the spark plugs slightly. Frequently the plug gaps will not be too long for battery ignition, but slightly excessive for the current furnished by the magneto.

852 Noise in 1911 Cadillac Gear Box.

From "Canadian," British Columbia.—Kindly give your expert advice on the following: I have a 1911 Cadillac and when running on high gear (direct drive) on a rough road with clutch disconnected from the engine there is a very distinct jerky pounding noise. It is very apparent, the jar being quite appreciable, and sounds exactly as if the "dogs" of the direct drive were being forced into and out of mesh, or that a counter shaft bearing were broken and a gear wheel jumping into and out of mesh, or that the differential radius stay rod were thumping violently against the holder.

We have tried the following: On a test the noise was found to only occur on rough roads, running on direct drive when the clutch is thrown out, as on meeting some bump or roughness.

It does not occur in low, intermediate or reverse, under any conditions, and quite disappears when the car runs in neutral. These tests were taken by running the car down an incline and at about the same speed and as near as possible under the same conditions. This hill was chosen because the noise was most apparent when coasting down on direct. Now as for remedies, the agents suggested that the bronze bushing might be worn where the male tail piece of the gear shaft enters the female recess of the direct drive pinion at the front (clutch) end of the gear box, and the noise was caused by the chattering of the shafts. The bushing was found very slightly worn. A new one supplied by the agents was then fitted, with no improvement. As there was slight play in this, it was removed. A new bushing was most carefully made, a dead fit for the female receiving end, and a suction fit for the tail piece absolutely free but with no shake whatever in any direction. The oil grooves were carefully cut and the whole charged with oil and light grease. On assembly, all end play and lost motion were made as small as allowable before assembling the gear box. On trial no improvement was apparent. The cover was removed and the gear box partly cleared of grease and graphite, and the action very minutely observed over a number of test runs; the direct drive dogs being tried both full mesh and different degrees less. No real improvement was apparent nor could the jar be located in the gear box though by sound it seemed somewhere near the front end of the gear box. The tension rod certainly did seem to jar and chatter back the gear box at times when the noise occurred, but the fact that with low reverse and intermediate in mesh and the noise was not apparent with clutch out, and when in neutral quite disappeared, seemed to tie it down in some way to the direct drive transmission beyond reasonable doubt. The agents are at a loss to help to give it up. On level roads and at any speed and under any conditions it cannot be made to appear. It would almost point to the ball end of the differential tension stay at the back of the gear box, but I cannot see how it can under the conditions, it appears, and it sure sounds in front, even with the ear almost laid on gear box front. Can you suggest some tests to locate for sure? With the

swiftly moving wheels and the jolting of the car over rough road, the only place it occurs, it makes visual tests of little value. There is no lift or shake in any shaft in gear box, nor is anything too tight there, and there is slight clearances between the teeth (as there should be). All wheels are in A1 condition, with very little wear. The car has been in no accident, and the transmission is in line and seems O. K. everywhere.

Reply.—We would suggest that as a test you block up the rear of your chassis with one corner higher than the other, so as to twist the chassis slightly, just as might happen should you meet an obstruction in a rough road. Be sure that the rear wheels are clear and start the motor, when we are quite sure the conditions would give you the jerky pound on direct drive. It is our opinion that the cause is imperfect alignment when the chassis is distorted. It is to avoid this that certain makes of cars use and advertise three-point suspension.

853 An Elusive Knock.

From Sidney Prince, Massachusetts.—I have just had my Model 24 Overland car overhauled and everything seems satisfactory except something resembling a knock which, as near as I can locate, seems to be produced by the exhaust on cylinder No. 1 and the inlet on No. 2, which seems to open and close together. I cannot see why these two valves should work in unison with each other, especially so as I failed to detect any of the other valves working on the same stroke and at the same time. The order of firing 1, 3, 4, 2. This opening and closing together produces twice the noise that is made by any other of the valves, giving all the symptoms of a knock or tap to every turn of the engine or when these valves are working. Can you tell me how to overcome this.

Reply.—By reference to the following table you will note that for every inlet stroke there is a compression stroke in another cylinder, likewise a power stroke and an exhaust. This follows the order of firing:

- No. 1.—Inlet, Compression, Power, Exhaust.
- No. 3.—Exhaust, Inlet, Compression, Power.
- No. 4.—Power, Exhaust, Inlet, Compression.
- No. 2.—Compression, Power, Exhaust, Inlet

Thus the inlet stroke in No. 1 is practically in unison with the exhaust in No. 3; the inlet in No. 3 in unison with No. 4; the inlet in No. 4 is in unison with the exhaust of No. 2, and the inlet in No. 2 is in unison with the exhaust of No. 1. Now the exhaust should open before the inlet in each of the above cases, but as the inlet and exhaust probably close on the centers, they should close at or very nearly the same time, if properly set and the cams are accurately cut. If your exhaust and inlet valves in any one pair open at the same time and close together, there is something radically wrong. If the other pairs do not open and close in unison, with apparently the proper timing, it should result in a decided unevenness at each second revolution of the crank shaft, one of the cylinders not giving as much power as the other three. The only remedy would probably be to replace the defective camshaft, if by adjustment you cannot make all the exhaust valves open at the proper time in the cycle, two opening exactly together, marking the time of opening on the fly wheel, and the other two just opposite and each at the same place. The inlet valves should open at the timing of the closing of the exhaust valves or a little later, as the exhaust closing marks on the flywheel

show, and should close a little after the opposite closing marks.

854 Two Peculiar Queries.

From B. H. Merrick, Connecticut.—Is it injurious to the engine or any part of it to start on the switch or self-starter by gas? What is the general opinion of the repair men?

2.—I would like to know how many dry batteries would overload a coil connected from carbon to zinc, and if one has six batteries, two 20, two 10 and two 5 amperes, and connected from carbon to the carbon around to the zinc to zinc back to the switch, are you getting any more than the lowest amperage?

Reply.—To say yes to your first query would be courting the hostility of every manufacturer of self-starters and every manufacturer of cars who uses self-starters, acetylene or gasoline. We cannot see how any injury could be inflicted on the motor, or any part of it by starting on the switch or using a self-starter so long as the spark is not sufficiently advanced to start the motor in the opposite direction. We have no means of knowing the general opinion of repair men as to the probable effect of starting on the switch or the use of self-starters. 2.—Some coils are guaranteed to stand 12 volts, which would be voltage from eight dry cells. From four to six will be found ample. It is not overloading the coil that excess voltage causes, but burning the insulation and shortcircuiting the secondary wiring and possibly perforating the condenser. If you have six cells, two of which show but five amperes, either give or throw them away. The other four should be sufficient to operate any jump spark coil for a short time at least. To prove what the amperage would be, try the four cells, which will work a coil that the six may not. The carbons of the six cells connected together, short circuited to the six zincs connected in a similar manner, will give you a voltage of $1\frac{1}{2}$ and an amperage of 20 plus 20 plus 10 plus 10 plus 5 plus 5 equals 70. This connection is called "parallel" and adds together the amperage. Connecting the carbon to the zinc is called "series," and adds together the voltage, which would be 9, while the amperage would be one-sixth of 70, approximately 12.

855 Lamps and Engine Cleaning.

From "York State Motorist," New York.—1.—In the next issue will you please suggest the possible cause of my rear lamp going out and tell me how to remedy same? The lamp seems to be in good order and it is my impression jars out. How can I remedy it?

2.—Is it possible to thoroughly cleanse a motor of carbon where the same has been used two or three years without resorting to scraping? If so what is best to use, chain or liquid remover? Please state fully.

Reply.—1.—The only remedy we can offer you is to trade your rear lamp for one that will not go out so easily, is to purchase one that is guaranteed by the manufacturers. A rear lamp that will not keep lighted is worth only what it will bring for scrap brass.

2.—The only really satisfactory method of removing two or three years accumulation of carbon is to soak the parts for some time in kerosene and use the scraper. Of course, this method necessitates disassembling the motor. Unless your motor is two-cycle, a good chain remover answers the purpose. If two-cycle, the links are liable to get into the ports. To our mind the only remedy for the abuse the motor has suffered, from neglect to remove carbon would be the course advised. Liquid carbon remover might cause

serious trouble unless you were able to get the loosened carbon all out of the cylinders, valve chambers, exhaust piping and muffler which you probably could not. Give your motor a tablespoonful of kerosene every two or three weeks putting it into each cylinder when hot.

856 Batteries Run Down.

From A. G. Jones, Nebraska.—We have a Maxwell Model 1910 which is giving us trouble in using the batteries. The batteries will not last over 48 hours. The car is timed and wired according to directions of the Splitdorf Model F magneto. The car runs fine. The only way to keep the batteries from running down is by putting in a switch next to the batteries. The car has a metal dash and starts on either the batteries or magneto, showing no "short" in the dash. The car has a four-unit coil. What is the trouble?

Reply.—We think very probably there is something wrong with the switch connections if you have wired according to the directions. Batteries should only be used for starting, as they will very soon become exhausted if used for regular running for any length of time. The very fact that you can lengthen the life of the batteries by putting in a switch conclusively proves there is a "leak" of current somewhere.

857 Compression Pressure.

From S. S. H., North Carolina.—In your next issue I wish you would kindly give us some information in regard to compression in motor cylinders. I understand the compression should be the same in all the cylinders of a motor. Should a pressure gauge, or compressometer, show the same compression in different size cylinders, that is should the gauge show the same compression in a 25 h.p. motor as in a 40 h.p.? What amount of compression is considered good for average efficiency? I recently saw the four cylinders of a Maxwell 30 $4\frac{1}{4} \times 4\frac{1}{4}$ tested with a compressometer which showed close to 60 lbs. in each cylinder, not over two pounds variation.

Reply.—Compression should be the same in each cylinder of every motor to get best results, even running and high efficiency. The size of the cylinder should have no effect on compression, which may, however, be affected by frictional and other volumetric losses in the inlet manifold and at the carburetor and speed of the motor. A four-cylinder 25 h.p. at 1000 r.p.m. could use the same compression as a 60 h.p., if designed properly for the same number of r.p.m. Compression varies in different makes of motors used for motor car work. Higher than 60 pounds compression sometimes causes pre-ignition. Theoretical designers are quite likely to design their first motors with excessive compression, and after they recover their equilibrium by getting their pinions clipped, are quite likely to be satisfied with lower compression. Some motors are being operated on 50 pounds compression while others may get 75, both above atmospheric pressure, as shown by gauge or compressometer. Smoother running is the result frequently of 60 or 65 pounds, which is probably about a fair average in actual operation.

858 Carburetor Leaks.

From Eugene F. Warner, M. D., Minnesota.—Will you kindly tell me the reason for a Stromberg carburetor, Type B, No. 3, leaking gasoline through the fixed air inlet? I have just had one installed on my

Hupp runabout and it has a tendency to choke up. It has plenty of air, but after running on the low throttle for some time it will load up on opening the throttle for a spurt of speed.

Reply.—The fixed air opening is so large that the velocity of the air is insufficient to completely vaporize the very heavy gasoline now on the market, and gasoline accumulates between the carburetor and cylinders. As soon as the throttle is opened the increased velocity of the air picks up this gasoline, after "stalling" the motor. We should advise reducing the gasoline supply slightly, decreasing also the amount of auxiliary air, and always opening the throttle slowly after running on nearly closed throttle for any length of time.

859 **A Leaking Carburetor.**

From Vannie A. Arnold, Indiana.—1—We have a Model 56 Overland Car with a Model L Schebler carburetor which leaks continually. No matter how you adjust the needle valve or air valve it leaks. When the motor is running it does not leak. But when it stops the compression of the engine causes gasoline to come out of the carburetor in a stream for a minute, then there is a continual drop. I have screwed up the nut on the carburetor but it does no good. If there is anything you can tell me of in this case would be very much obliged.

2—Also is there any solution manufactured for cleaning mohair tops?

Reply.—Your needle valve probably needs regrinding. This year's models use a steel capped needle valve, to obviate this trouble. The leak of gasoline when the motor first stops is explained in our reply to E. F. Warner, Minnesota, in this issue. 2—Felton, Sibley & Co., 136 N. 4th street, Philadelphia, Pa., make a dressing for mohair tops and you may find their advertisement in this issue.

860 **A Cylinder Misses.**

From A. R. Smith, Michigan.—I am an owner of a 1910 Model 16 Buick and have been having some trouble during the past year with the engine on account of the front cylinder and spark plug fouling with grease or oil and carbon and consequently missing. The spark plug will become coated with soot after running a few miles and then the cylinder begins missing. The car has been run 7,000 miles and the other three cylinders have never bothered. The trouble is due to too much oil getting into this cylinder but the machine is in good condition, having just been overhauled by a good mechanic. The rings and cylinder are not worn and the electrical equipment and spark plug are in excellent shape. What would you advise so as to prevent so much oil getting into this first cylinder? Would lowering the level of the oil in the basin of the crank case help any? Any suggestion you can give me will be thoroughly appreciated.

Reply.—If you will carefully clean out with kerosene all the oil in the front cam shaft gear housing, then put back a little fresh oil and cut down the supply to the front cylinder, we think you will be able to overcome this trouble. The oil splashes from the front part of the housing to the piston in the front cylinder. We should not advise lowering the oil in the basin of the crank case, or do anything to "starve" the other cylinders.

860 **Carburetor Connection.**

From W. B. T., Maine.—I have a double cylinder, left hand drive car of ancient vintage. What I want to

know is, would it give more power to connect the carburetor to the crank case and then connect the crank case to the inlet valve cages? With this arrangement, when the pistons were travelling from the crank case there would be a greater suction, helping to vaporize the fuel better and take in nearly twice as much gas into the crank as now goes into the combustion chamber. Then as the pistons return they would compress the gas into the cylinder in which the piston is on the suction stroke. I have never heard this being tried.

Reply.—It would not give you any more power to connect your crank case to your inlet manifold; it would be a dangerous experiment, for a "back-fire" would probably blow the motor up, and you would not be able to lubricate wrist or crank pins, pistons or main bearings. You would be getting—provided you could do the impossible—a two-cycle effect with one-half the usual explosions, and one-half the number of exhaust strokes. It is our opinion that the motor and car have both outlived their usefulness, and to avoid useless expense for unsatisfactory results, they should both be discarded.

A Veteran Car User.

From John J. Cox, Illinois.—There are many things which would be a great saving to a car owner if he would but stop to think of them. One thing, is the reckless manner of running a car over rough ground on high speed and also running over steep grades too fast. Nothing wrecks a car any faster than doing these injudicious things. An automobile is about like any other machine, it will run all right if it is used well. It is the same as with the case of a good horse. You can soon ruin even this noble animal by harsh and rough treatment.

I have a one-seated Maxwell runabout, 1910, that I have used about two years. It is in excellent condition today. I have never had any part of the machinery broken during that time and it is about as good as new except that the tires are somewhat worn. I was the first man in this locality to use rain water in my radiator, but others are now using it at present, feeling that nothing else will insure a clean radiator. For over a year I have been mixing cylinder oil in the water before I put it in the radiator. This keeps the radiator from rusting. I found that out when I took the water out last winter, as it showed signs of rust, but I do not see anything of this since I used a little oil in it. When I use my car all day I put it up on blocks at night so that the tires do not rest on the ground while not using it. It gives the tires a chance to contract over night. When I put up my car during the winter I also jack it from the ground and let quite a good deal of air out of the tires.

A great many cars are ruined by reckless driving, but the car itself is not to blame for this, it is the fool that is driving it. This is a somewhat hard term to use but I feel it is not unjust.

I am the oldest man in this county that runs an automobile who himself takes care of it. I am in my 76th year, but I still enjoy my car.

A Good Ford Car Record.

From L. E. Norfleet, M. D., North Carolina.—I have run a Model T Ford since May, 1909, and it runs as good as new today. Its average cost per month has been about \$12.50, one-half what a horse and buggy cost me to keep. My machine is just as the Ford Company sent it to me, never even having had batteries placed on it, and what replacements I have needed have always been charged to me at very reasonable

figures. I find the Monarch the best plug for my use, and it is the very easiest plug I know of to clean.

The Two Cycle Engine Trouble.

From Otto Pierson, Iowa.—In reply to H. S. Bemsderfer, No. 813, as to his two cycle engine trouble, I had the same experience. His trouble may be a slight leak of the explosion passing the piston and the burned gas entering the crank chamber, thereby spoiling the next charge, causing the miss. But as there would be no burned gas on the miss stroke the following charge would be pure which would cause his engine to "four cycle." Remedy: Put about a heaping teaspoonful of flake graphite into the cylinder and he will be surprised at the good results.

Two Coil Trouble Tests.

From "Canadian," British Columbia.—In relation to the trouble with a coil, as set forth by No. 795 in your February issue, the following shows two simple tests where coil trouble is suspected. Whether a dry or secondary battery be used is immaterial if the voltage is O. K. Before the test be sure the battery is O. K. Also that the platinum points are clean and true and free from dirt or pitting; also see that all connections are clean and bright and well tightened. Especially look at the battery connections. Connect the wire that goes to the commutator, to the minus pole or the pole that goes to the frame of the engine. Connect the H. T. wire to a good spark plug, one you are sure of, and that is clean. Open the point from $\frac{1}{4}$ to $\frac{3}{8}$ inch. Any coil should jump this if it can be expected to jump under compression when all is hot. Lay the spark plug on a chunk of dry wood as shown. Connect the iron body of the plug with a couple of turns of bare wire to the wire from C to the minus pole as shown at Fig. 1. Put the volt meter across the battery poles as shown. Screw the platinum points well apart. Connect the plus pole of the battery to the other, or wire from the minus switch stud on the coil. Now the circuit is all complete and you only need to screw down the platinum screw to make the coil

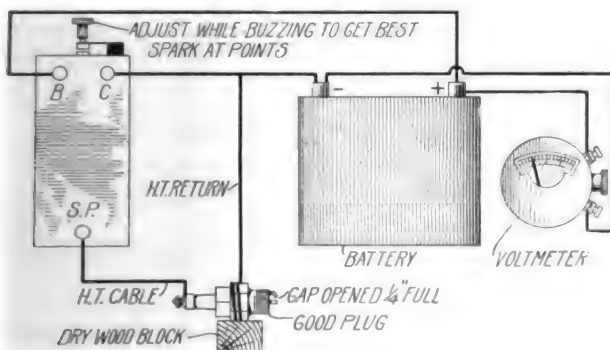


Fig. 1.—To test a doubtful Coil Unit.

work. Be sure and close the H. T. circuit as shown before putting the coil into action, or you will most likely break down your coil or get a bad shock, or both. In running with a wide gap the coil had better be put on a piece of dry wood also, or you chance a shock when you adjust the buzzer by the H. T. leakage through the bottom of the coil and through the operator. Remember while you have perhaps six volts in the primary coil you are handling in the neighborhood of 20,000 to 30,000 on the H. T. wires. Motorists do not generally appreciate this. The amperes of quantity is small—infinitesimal—it is true, but the pressure is there all right, and generally carries conviction if you doubt or forget.

Now adjust the buzzer by means of the platinum screws until you get the best result at the plug. Read the voltmeter while your coil is buzzing to be sure your battery is not at fault. Before the test be sure the platinum sits squarely, not as is often the case, partly on and partly off. These must be got square, clean and true, before the test. Do not keep up the test longer than is absolutely necessary. A short test will not hurt but if unduly protracted it is harder on the battery coil and battery than car service, as it is continuous. If on this test you get a poor, very thin or intermittent spark, or

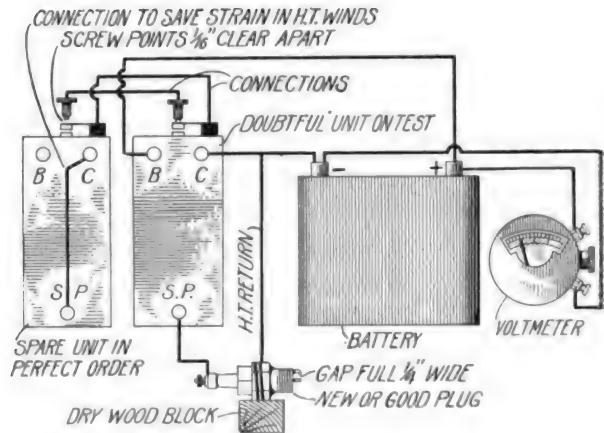


Fig. 2.—Test for broken-down Condenser.

no spark at all, while the platinum points spark meet more fiercely than on your other units, it is safe to think the condenser is "gone bum."

Now as to the average owner the condenser is a thing of mystery, to be spoken of with bated breath, I give a simple little test any owner can try for himself which will conclusively tell him whether his condenser is wrong or not. Remember, a coil will buzz O. K. with a wrong condenser or with no condenser at all. Select a coil unit from your set which runs best, or borrow a reliable unit of the same size, or near it as possible. The test won't hurt it. Open the platinum points fully $\frac{1}{16}$ inch clear as shown. Have your doubtful unit connected up exactly as for the first test, leaving the platins wide apart till you are ready. Now connect the H. T. terminal of your good coil direct to the commutator or breaker terminal with a bit of bare copper wire. This is to get rid of the strains which would be thrown on the H. T. windings by the condenser oscillations which will be presently set up. Now connect the bridge which holds the platinum screw point, or the screw itself, to the similar screw or brass bridge on the doubtful coil; also connect the little block on to which the platinum bearing vibrator blade is screwed to the similar block on the doubtful coil with insulated wires, being very careful not to get the platinum blade on the doubtful coil loose or out of true, as to the platinum points. After connecting, see that all is tight and the points still true before the test. Now leaving the points of the good coil well apart, screw down the platinum screw on the doubtful unit until the coil buzzes, and adjust exactly as in the first test. This throws the condenser of the coil perfect across the points of the bad coil, making it take the place and do the work of the one we suspect. The connections at this point are shown in Fig. 2. If the condenser was at fault the flashing at the platinum points of the defective coil will have greatly decreased or even disappeared, while the spark at the plug gap will be fierce and bushy and noisy.

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AUTOMOBILE ECONOMY.

Surely, the automobile should get a fair show from those most interested in it, but it seldom does, when consideration is being given to its economy.

Not long ago an official of a well-known motor car company, with the best intent, went into the details of the cost of the upkeep of a car, and it was sent broadcast and copied extensively over the country. The conclusion he reached was that any one having an income of \$2000 or \$2500 a year could afford to keep a car and that the cost of such upkeep, provided the man himself drove the car and did not own a garage, was \$28.35 a month.

For ordinary pleasure driving, where the owner uses his automobile about as often as he would a horse and carriage, the foregoing estimate is too high. This is assuming that no one cares to drive for pleasure all the time, or even half the time, for that matter. It is assuming, likewise, that to a person of fairly good taste, the length of the distance he rides is no gauge whatever of the amount of pleasure he gets from such a ride. Many own cars who do not spend half of \$28 per month in their up-keep. They ride when they want to, and as a matter of pure pleasure, they get better returns from a trip of 15 or 20 miles than from one of 40 or 50 miles.

The upkeep of an automobile depends entirely upon how it is used and how much it is used. If one has his own garage and he uses his car but little and with care, the cost of upkeep is very little. If he hires it kept in a garage in a large city and uses it carelessly and constantly, it is expensive and unless it is used for business purposes alone a man should have more than an income of \$2,500 a year to be able to stand the expense.

But in any event, it should be remembered that an automobile is not like a horse, where the cost of

upkeep is nearly as much when the animal is not used at all as if he were used every day.

The point to be made clear is that by any fair comparison, the automobile is far more economical than the horse. It lasts far longer, it costs as little when it is being used as the horse, and when not being used costs so much less than the horse that a comparison could not well be made.

WIRE WHEEL ADVANTAGES.

Two makers of high powered automobiles in this country are planning to use wire wheels on next season's cars. The fact is, comparative tests of wood and wire wheels have recently been made abroad and wood has been shown to be weaker.

In the matter of exact tensile, or possibly it may be more correct to say, direct weight bearing strength, wood wheels may be strong enough and sufficient for all purposes, but in sidewise stress wire wheels are much more reliable. And this has been fairly well demonstrated.

The only objection to wire wheels is that it is more trouble to keep them clean and sightly. But by the use of a well devised brush the cross wire spokes do not offer anything serious to fairly quick cleaning.

There are two other important considerations to the advantage of wire wheels. One is their reduced weight, and this means much more than is usually considered. There is nothing that will so tend to cause an automobile to propel "dead" and hard than heavy wheels. Extra weight in the car or on any other portion of the car is scarcely perceptible compared to extra weight in the wheels. The other advantage is the increased mileage of tires. In tests made in England, it was found that the average mileage per tire cover for wire wheels was 3,454 miles, while on wood wheels it was but 2,050 miles.

This last advantage is due to the added torsional movement or "give" of the wire wheels, especially in fast driving. It not only saves the tire in its use without the use of the brake, but in the case of sudden braking strain it is far less destructive to the tire. As tire cost is by far the greatest of any one thing in automobile upkeep, the importance of this saving should not be ignored.

STANDING IN THEIR OWN LIGHT.

Complaints are still coming in concerning the high prices charged by manufacturers for automobile parts. As in most cases of this kind, the facts do not all favor either one side or the other, but the balance of logic is on the side of the purchaser.

That the manufacturer should make a profit on duplicate parts no fair-minded person will deny, but the profit may well be small rather than large, and if, as has been charged by some of our readers, there has been a disposition shown in some quarters to sell parts at such a high price that it will make up for depleted profits in selling cars at an abnormally low price, then it is of course short-sighted business policy.

On the other hand, it is unreasonable to suppose that some small part that may not cost more than 25 cents can be sold to a purchaser in a distant State for even 100 per cent. above the cost to manufacture. Often the cost of going to the store room, getting the part out, packing and addressing it, together with some possible correspondence, may cost in time on the part of those doing the work far more than the article itself.

About three-quarters of the trouble in this world, business and otherwise, is caused by individuals who

can only see one side of the case and that their own side. And the less one is able to see of any side save his own, the greater the trouble. If manufacturers could but see that after they have sold a man a car it is worth something to have his loyal friendship and respect, then the complaints of high prices for parts would be far more infrequent.

CHEAP MUSCLE, FLESH AND BONES.

Some one who has just returned from Europe expresses his surprise that so few labor-saving devices are used there in the making of automobiles. He describes the situation thus:

"In an American factory one machine at one operation will furnish three sides of thirty-two cylinders. In a foreign factory the same time is used for finishing one side of one cylinder. That means doing the work ninety-six times as fast and doing it better."

This is all interesting, but he should have added that the only reason why labor-saving machines are used less in Europe than in this country is because labor itself is so much cheaper there. It was not so many years ago that women pounded out with a hammer most of the nails that were used in England, and all because human muscle and flesh were about the cheapest things that existed there. But it will not do to imagine that this country can long depend upon any advantage in the way of labor-saving devices. Europe will not delay a single day in adopting them whenever it will pay to do so.

SHARPER COMPETITION.

Dealers have now begun to understand the necessity of paying cash for accessories and thus taking advantage of discounts. There was a time when the profits in selling accessories was large, but that time has passed. The competition has already begun to be sharp and some dealers have been forced out of the business simply because they neglected to secure the cash discounts, their competitors thus under-selling them.

Thus the automobile business is rapidly taking the same form as those long established industries where in so many cases, the discounts cover the profits. To meet this condition, the accessory dealer must make price a coldblooded proposition, remembering that the consumer has now begun to make a comparison of prices just as he does as to the prices of everything else he buys.

As a result he must pay promptly, discount his bills, and establish judicious rules as to payments by his customers. In this way only can he hope to meet competition.

ON A GALLON OF GASOLINE.

Whether a car will run twenty or thirty miles on a gallon of gasoline amounts to only a difference of about \$20 in cost of upkeep every 6,000 miles. But sometimes that excess of gasoline may mean that something serious is at fault with the mechanism of the car that consumes it.

It may mean something far away from engine or carburetor design. It may be due to something wrong in the balance of the car; it may mean that the tires are heavier or are less resilient; it may indicate that something is wrong with the bearings; that the car chassis has been sprung in some way; or as is sometimes the case, that the driver does not know how to get the most possible distance from a gallon of gasoline.

So the consumption of gasoline is important, after all. And this importance is of such a nature that car

owners and manufacturers, and back of them, car designers, should study out the matter, and if a car uses too much gasoline, find out just what causes it other than the load that it carries.

Why it requires more power to propel one car than another carrying loads of the same weight is both important and interesting, but it is a matter somewhat difficult to determine. One thing is certain: It does not always depend upon either the weight of the car or upon the design of the engine.

Some of our older readers probably rode bicycles when they were in vogue, and possibly they may have found out that in the case of a tandem wheel, one could push it up an incline when seated on the rear seat, with the front seat unoccupied, when it was impossible to do so while sitting on the front seat with the rear seat unoccupied. We are inclined to think that the distribution of weight or balance of automobiles has not yet been studied out scientifically.

PAY OF CHAUFFEURS.

Someone who comes in contact with a good many car owners feels that the time is fast approaching when chauffeurs will be working for small wages. He says he knows of a good many car owners who have let their \$40 a week men go and have substituted in their places men at \$20 a week. He adds:

"The matter of fact is that so many drivers are being turned out daily from schools and shops that it is easy to select. A great many men are beguiled into taking courses in automobile schools by reports that high salaries and easy jobs are the portion of any chauffeur. My own opinion is that the day will not be far when the chauffeur will be receiving money on the same scale as the coachman."

Possibly he may be right. But coachmen who can mend harness, who can shoe horses, who are veterinaries, who are always tidy and who have Chesterfield manners, are still getting pretty fair wages—and they deserve them. If chauffeurs get as much as coachmen of this sort—and they have need of still wider accomplishments—their wages will never be very low, and they never should be.

CAR DEMONSTRATIONS.

At a recent meeting of some forty representatives of commercial vehicle manufacturers in this city, there was considerable discussion regarding the abuse of demonstrations, and it was the consensus of opinion that charges should be made for such demonstrations, the payments therefor to be refunded upon the purchase of the car.

Possibly a rule of this kind may be necessary, but on the other hand, few intending purchasers of a commercial car would spend the time to take part in a demonstration unless they made it in good faith, and having made it in good faith, it seems hardly fair to penalize them for trying a car that has proved unsatisfactory.

THE MUFFLER CUT OUT.

Although the advantage gained in power by the use of the cut-off has always been over-rated, not much dependence should be placed upon the recent tests made to determine its natural addition to the power of the motor. The fact that according to the figures given out the power seemed to be less at some speed with the cutout open than with it closed, throws doubt upon the test.

With an efficient muffler the loss of power is probably small, but of course it must be something, and this automobile drivers have themselves had repeated demonstrations.

LESSONS FOR DRIVERS.

Carelessness and Ignorance Responsible for Most Accidents.

A "scare" newspaper heading says in black letters, "Autos Steadily Becoming Safer." Incorrect. Automobiles always have been safe, so it would be impossible for them to become safer. But that there are fewer accidents than formerly, considering the increased use of the automobile is strictly true, and this is due, not to safer cars but to safer drivers.

But there is room for still more safe driving, and despite the charges occasionally made that it is not a good plan from the manufacturers' standpoint to "stir up such things," it seems to us that it is the best possible plan from the standpoint of the producer to stir them up. We have never yet published an account of an automobile accident unless it was due to either flagrant or a certain small amount of carelessness on the part of the driver, and the best way to avert danger is to not encounter it or give occasion for it.

The horse is really a dangerous animal to drive. He is liable to a half-dozen endangering acts which the driver is unable to prevent. The automobile is perfectly safe if it is handled in a rational way. A few of the accidents of recent date are appended.

The Loss of a Tire.—Near San Jose, Cal., a car containing a young man and his fiancée had a tire collapse. It swerved, struck a telephone pole, and landed with the wheels in the air. The young woman received injuries from which she soon died. The young man was fortunate enough to have been thrown clear of the motor. He says he was not going at an excessive speed, but at a safe speed, the throwing of a tire does not produce such disastrous results. It is only when a car is going at a high speed that it cannot be kept in the road when a tire bursts.

Pulled the Wrong Lever by Mistake.—A party of five Cornell students went down a 25 foot embankment near Ithaca, N. Y., recently. The car they were in was stalled and the chauffeur by mistake pulled the reverse lever. None of the young men was seriously hurt, but one had his wooden leg broken.

Permanently Disfigured.—In Louisville, Ky., a car containing three women and a chauffeur skidded on the ice. One of the wheels struck a stone post and was crushed. One of the women was thrown to the concrete walk and permanently disfigured, and the others received painful but not serious injuries.

Could Not Think Quick Enough.—In Fresno, Cal., a young woman was killed and her intended husband seriously injured when the car in which they were riding ran into the gutter, overturned, and was pretty well wrecked. It is said that the driver was unfamiliar with the car and must have thrown on the clutch with his foot instead of the brake. The local paper makes the following comments which point a moral for others: "The young man who was responsible is a man of unusual intelligence and self-command, absolutely sober, responsible and cool, alert and cautious, and experienced in the driving of an automobile. In intellect and in temperament, he could be described as the ideal man to run a car with safety. But the car was a new one, with which his familiarity was intellectual and had not yet become instinctive. So, when a sudden emergency arose, though he doubtless knew exactly what to do, the time was too short for the conscious processes of the mind to perform the act. Until an operation has become so familiar that it can be done without thought, it is too slow to meet an instant emergency. The higher opera-

tions of the mind are the ones which are least adequate to simple practical reactions. Action has to be, literally, quicker than thought.

Wrecked by Joy Riders.—In New York City a handsome limousine carrying five men skidded across Broadway at 113th street in an effort to dodge a milk wagon, and crashing into the curb demolished the motor-car and a lamp post. It appears that the driver saw some pools of water in the street formed by the heavy showers and tried to avoid them. The big machine skidded, and just at that moment a milk wagon crossed the street. The chauffeur threw in his clutch and emergency brake at the same time and the rear wheels locked. The slippery pavement afforded no traction and the car described a semi-circle about the milk wagon, and the rear wheels smashed into the curb. A lamp post which stood on the corner was shattered and the arc-light fell to the street with an additional crash, leaving the immediate neighborhood in gloom. As the policemen hurried to the scene the chauffeur jumped out of the car with his hands to his face and ran. A policeman caught him and brought him back with his face bleeding from cuts. He showed an automobile owner's license, the number on which did not correspond with the number on the smashed car. Then the police said he admitted that he had taken out his employer's machine without permission. The car was a wreck. Every pane of glass was shattered, the radiator and hood were bent and twisted and the rear wheel rims smashed.

The four men were all pretty well bruised and cut.

The Lowest Priced Efficient Car Made.

The Liberty Brush runabout is the lowest priced car of proved utility that has thus far been made. It sells for \$350, and with headlights, top and windshield, for \$400. It is made by the United States Motor Company. The following are the specifications:

Color—Dark blue.
Seating Capacity—Two persons.
Clutch—Multiple disc.
Wheel Base—80 inches.
Gauge—56 or 60 inches.
Tire Dimensions—Front, 28x3 inches; rear, 28x3 inches.



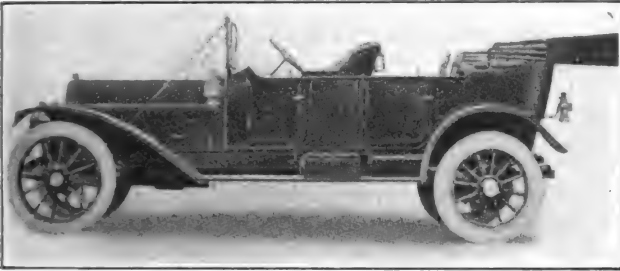
Liberty-Brush. Price \$350.

Brake Systems—Expanding on both rear wheels.
Horsepower—10.
Cylinders—One.
Bore—4 inches.
Stroke—5 inches.
Cooling—Water.
Ignition—Jump spark.
Electric Source—Dry batteries.
Drive—Double side chain.
Transmission—Internal gears.
Gear Changes—Two forward, one reverse.

A 142 Inch Wheel Base.

The Stevens-Duryea model Y fore door touring car has probably the longest wheel base of any touring car made. The price is \$4000. It is 142 inches. The following are the specifications of this remarkable car:

Color—English Purple Lake or Brewster green.
Seating Capacity—Seven persons..
Clutch—Multiple disc.
Wheel Base—142 inches.
Gauge—56 inches.
Tire Dimensions—Front, 36x4 inches; rear, 36x5 inches.



Stevens-Duryea for 7 Passengers.

Brake Systems—Contracting and expanding on both rear wheels.
Horsepower—(A.L.A.M. rating) 54 I.
Cylinders—Six.
Arranged—Vertically, under hood.
Cast—In pairs.
Bore— $4\frac{3}{4}$ inches.
Stroke— $4\frac{1}{2}$ inches.
Cooling—Water.
Radiator—Cellular.
Ignition—Jump spark.
Electric Source—High tension magneto and dry batteries.
Drive—Shaft.
Transmission—Progressive sliding gear.
Gear Changes—Three forward, one reverse.

SHOCK ABSORBERS.**Devices as Applied to Springs and to Other Parts of the Car.**

The term "shock absorber" has been made to apply to two different and distinct types of mechanism. This naturally leads to some little confusion. First of all, we have the shock absorber which consists of a brake arranged between the axle and the spring part of the car in order to provide additional friction for the expansion of the leaves, and secondly there is the shock absorber which takes the form of an elastic spring shackle and leaves the main spring entirely unaffected so long as its own working is concerned. While both devices do absorb shocks, these shocks are of different kinds, for, while the function of the first is to make the road shocks less by introducing friction which reduces the vertical oscillations of the car, that of the second is to make the springs more lively, or, in other words, to provide a secondary suspension of the car with a view to reduce the smaller shocks which the spring is, of itself, unfitted to sustain.

One difference between the two is that, whereas the first is particularly adapted for high speed work, the second is more especially intended to promote comfort at moderate speeds.

The type of shock absorber under review is a device

in which the natural resilience of the spring plates is retarded or loaded by means of the friction between the leaves when in the movement of the whole they individually slide over one another. It is therefore, capable of protecting the vehicle from heavy shocks. The value of such shocks depends, firstly, on the speed at which the vehicle is travelling, and, secondly, upon the height of the bumps or the depth of the depressions which the wheels encounter. If, as in the case of a racing car, the speed be high, then actually small road inequalities will impart large shocks, and to insulate these from the car short and strong springs will be required in order to provide sufficient rapidity of action. Such springs, however, are unsuitable for moderate speeds, for the reason that they are almost incapable of absorbing the minor shocks due to the smaller surface inequalities of the road.

Progress towards increased comfort has demanded that the effect of such small shocks shall be as far as possible neutralized, and the tendency of the designer has therefore been to install springs sufficiently long and flexible to achieve this end. Chassis dimensions, and the fact that such long and flexible leaf springs are unsuitable for high speeds, impose, however, a limit beyond it is inexpedient to go with this type of spring, for it will be seen that to achieve comfort under all conditions the laminated spring, if used alone, would need to be here strong and there weak, because if it were flexible enough to accommodate the small vibrations then it would not be sufficiently strong to withstand heavy shocks.

It is for this reason that the elastic spring shackle has been introduced, and also that it has so rapidly sprung into popularity.

The great advantage of the supplementary spring is increase of comfort under all conditions, provided always that its vibrations do not harmonize with those of the main spring. This proviso is a matter of considerable importance, for, if the two springs act together instead of being always in opposition, they will periodically come in coalition, and the result will be that the shocks felt by the car would be occasionally increased rather than diminished by supplementary suspension. The same defect is by no means absent in a single spring system, and becomes apparent when the periodicity of road inequalities is either the same or a multiple of the periodicity of the spring vibration. Regular road inequalities at equal intervals are not met with in this country, at any rate to any marked extent.

Among the points that are worthy of consideration as applied to supplementary suspension devices are the following: First, it is highly desirable that, in view of the large range of movements which the working parts have to undergo, an adequate system of lubrication should be installed. This is especially necessary when one considers the liability for wet and grit to get to the moving parts when the car is being washed. In some of the devices no means are taken to enclose the mechanism, even when there are several sliding parts. In our opinion this is bad, both on the score of appearance and of wear. Every means compatible with the production of an instrument at a moderate price should be taken to ensure that mud and dirt cannot have access to the working parts of a device which is to be applied in a position in which it frequently gets covered with dirt. Further, such protections must essentially be correctly designed. As was the case with so many of the old chain cases, an ill-fitting covering frequently only means that grit is invited to enter and prevented from getting out, which, of course, is worse than if no pro-

ective covering were fitted at all. Next, as previously suggested, some means of adjustment are, if not always absolutely necessary, at the least highly desirable. Finally, every care should be used to avoid side-play.

AUTOMOBILE LIGHTING.

Results Obtained By the Development of the Electric System.

J. D. Morgan, Birmingham, England, Society of Electrical Engineers.—During the past few years serious attention has been directed to the development of

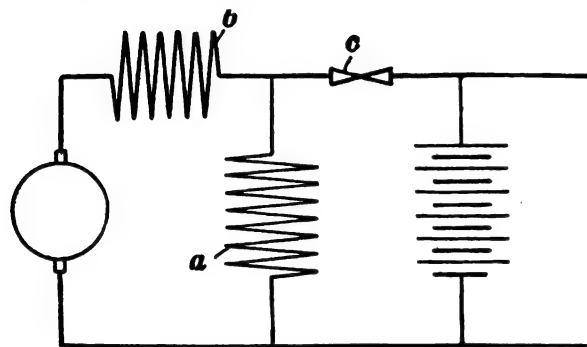


Fig. 1.—Wiring Diagram.

electric lighting systems for motor road vehicles, as it is widely recognized that something superior to the ordinary methods of oil and acetylene lighting is urgently needed. In the present paper the object is to discuss briefly the subject of current generation, giving a short account of the most notable work which has recently been done, and of tests made by the author on machines of representative types.

By common consent the use of a battery alone for providing current is unsuitable, and a dynamo is essential. The construction of a suitable dynamo presents peculiar difficulties, and the crux of the lighting problem is connected mainly with the dynamo. The principal conditions to be complied with are that the dynamo must be capable of maintaining a practically constant

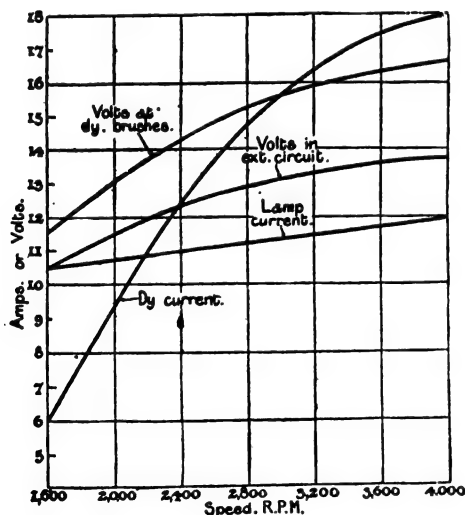


Fig. 2.

voltage over a wide range of speed variation and under different loads, and that any pressure variation must not seriously affect the brightness of the lamps. It is usual to arrange for the dynamo to supply current at the normal voltage when the vehicle is moving at the rate of from 10 to 15 miles per hour, and to maintain the voltage as nearly constant as possible at speeds up

to 50 to 60 miles per hour. When the vehicle is at rest or traveling below 10 miles per hour the current is supplied entirely, or for the greater part, by a battery.

A familiar criticism is that there is little or nothing new in the problem of the dynamo for motor road vehicle lighting, as it is strictly analogous to that of the dynamo for train lighting, upon which a large amount of valuable work has been done. To some extent this is so, but the task before the manufacturer of motor vehicle dynamos presents peculiar obstacles in that simplicity, compactness, and reliability must be obtained in a much higher degree than is essential for train lighting where skilled supervision is constantly exercised.

A method of regulation which forms the basis of several known types of electrically regulated machines consists in the use of a separate counter-exciting dynamo adapted to diminish the excitation of the principal machine in such a manner that the field of the principal machine varies inversely as the speed. This device is obviously objectionable on account of the duplication involved.

Several attempts have been made to construct machines in which a series compensating winding is used, the idea being to diminish the strength of the field progressively by the current in such winding after the normal voltage has been reached. Obviously a constant voltage cannot be obtained, but what is aimed at is to keep the voltage variation within practical limits over

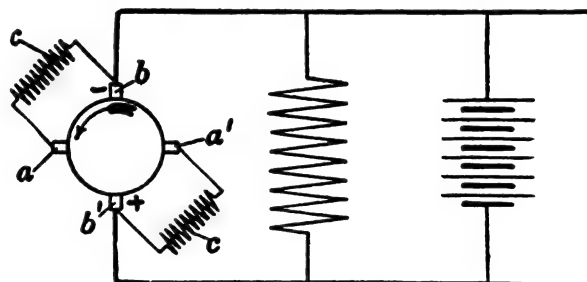


Fig. 3.—Wiring Diagram.

a given range or speed variation. A machine embodying this principle for road vehicle lighting is produced by the Bleriot of France, and is illustrated diagrammatically in Fig. 1. The arrangement differs from the more familiar devices of this type in that the shunt winding, *a*, is connected across the external circuit, and the current leaving the armature passes through the series winding, *b*, before reaching the shunt winding. A centrifugal switch at, *c*, closes the external circuit when a certain speed is attained. Usually the arrangement is identical with that of an ordinary compound-wound dynamo, excepting that the series winding acts in opposition to the shunt winding. By the Bleriot method a much larger voltage variation can be produced at the brushes than is experienced in the external circuit, and the current through the shunt winding is subject to smaller fluctuations than it would be if connected across the brushes. Consequently a greater compensating effect can be obtained from the series winding than would otherwise be possible. A representative result selected from a large number of tests made upon a Bleriot machine is shown in Fig. 2. The machine was intended to supply lamps consuming about 12 amperes at 12 volts but was designed to give out as much as 25 amperes. In the experiments the battery used was a set of six cells of 50 ampere-hours capacity (a size commonly used in motor car practice). The range of speed variation over which the machine appeared to be useful was not as large as might be desired. It will be observed that between the speeds of 1,600 to 4,000 revo-

lutions per minute the voltage rose from 10.5 to 13.75 and the current increased from 6 to 18. Over the same range of speed variation the voltage at the brushes rose from 11.5 to 16.75. The increasing difference between the two voltage curves illustrates clearly the usefulness of the arrangement of the windings in the Bleriot machine for regulation purposes. It is possible that with a larger battery or a machine designed to give a smaller output at the same voltage better regulation would have been obtained.

A further result of the test was a demonstration of the fact that the regulation of the machine is dependent on the condition of the battery. With the battery run down superior regulation to that shown in the diagram was experienced, but when the battery approached the fully charged condition the voltage in the external circuit increased without increase of speed. It is sometimes urged as an advantage that certain machines are capable of giving current largely in excess of requirements. Apparently this is fallacious; it is a disadvantage rather than an advantage. The best results as

ing the main brush, b' , with the auxiliary brush, a' , will, when the machine is running on open circuit, flow from b' to a' and, in the resistance connecting the other pair of brushes, will flow from a to b . The effect of these currents, which of course also flow in the armature coils between b' and a' , a and b , is to strengthen the main field. As the load increases, an armature reaction is set up which displaces the axis of the field forward and by so doing reduces the current in the resistances, c , and consequently the magnetic field is also reduced. When the axis of the magnetic field is displaced by 45 degrees, there will be no current at all between the main and auxiliary brushes, as they will then be at equal potentials. A further displacement of the magnetic field due to increasing load and speed will cause a current to flow again between the main and auxiliary brushes, but such current will now be in the reverse direction and its effect will be to weaken the main field instead of to strengthen it. Thus the output of the dynamo becomes self-regulating. The performance of the machine is illustrated in Fig. 4, an 8-volt battery being used. Cutting out all

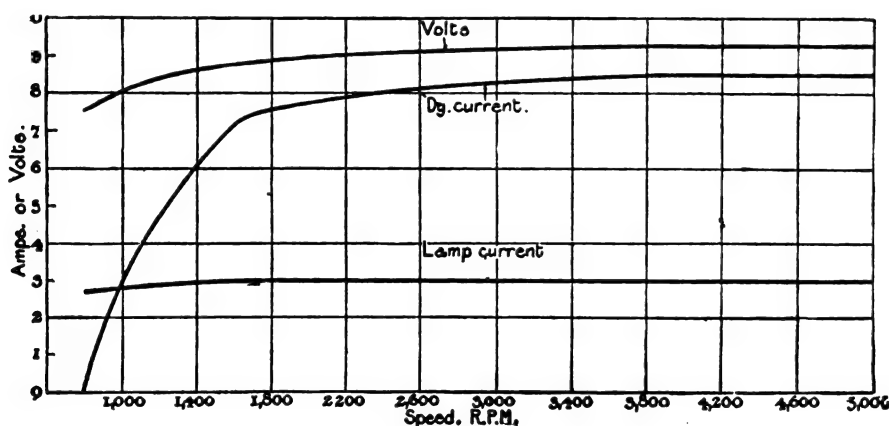


Fig. 4.

regards steadiness of voltage are obtained when the maximum output does not exceed the consumption by more than about 2 or 3 amperes.

It might be inferred that superior regulation could be obtained by separately exciting the field windings from a battery or other source of constant potential, or by using permanent magnets. The author believes that machines constructed with permanent magnets and a regulating series winding have been placed on the market for motor car lighting, but he has not been able to obtain one. It would be rather surprising to find that they were serviceable, for the winding must exercise a demagnetizing effect and in time render the magnets useless. Regarding the use of a separate exciting battery, this would obviously be objectionable on account of the extra battery required and the additional attention necessary for keeping the battery in proper condition.

An exceedingly good and interesting machine of the interbrush type is that of Trier & Martin, of England, which is illustrated diagrammatically in Fig. 3. The machine is of two-pole shunt-wound construction, and is provided with a pair of intermedate brushes, a and a' , placed midway between the ordinary main brushes, b and b' . The main and interbrushes are connected together through resistances, c . It will be observed that the arrangement differs from the more familiar Leitner arrangement in that the interbrushes are connected to the main brushes instead of to the field windings. The makers describe the action of the machine in their patent specification as follows: "As, b , is the negative and, b' , the positive brush, the current in the resistance connect-

ing the lamps caused an increase of the maximum voltage of $\frac{1}{2}$ volt and a diminution of current of less than $\frac{1}{2}$ ampere. With lamps consuming $4\frac{1}{2}$ amperes the maximum current given by the machine was 8 amperes.

Another interesting machine is the Midgley-Vanderwell, or C. A. V. machine of England. This is of the type with which electrical engineers have been familiarized by the Rosenberg machine, depending for its self-regulating property upon the short-circuiting of certain armature windings. The behavior of a machine in practice is shown by the diagram in Fig. 5, which is representative of a large number of tests with the machine coupled to a battery and lamps as in service conditions. It will be observed that when the maximum voltage is reached it remains remarkably steady. A drop is shown in current at the higher speeds. This is probably due to defective brush contacts. It will be observed that the maximum current directed into the battery was 1.2 amperes. With such a small charging current a practically uniform condition is maintained in the battery, and the latter is therefore not so likely to interfere with the regulation of the machine as when a machine is used the output of which is largely in excess of the demand. The C. A. V. machine also requires the use of a battery before its self-regulating property can be asserted. As to the inability of the self-regulating machines here discussed to operate without a battery, it will be observed that in each case a rapid increase of current and a comparatively slow increase of voltage is obtained during the lower speeds of the machines. Without this, self-regulation cannot be obtained, for it is upon the production of a large increase of current with a compara-

tively small increase of voltage that the machines depend for their action. This fact also makes a battery an indispensable part of the equipment.

Another interesting self-regulating system is that of Grob, of Europe, shown in Fig. 6. The machine, a, is separately excited by a battery, b, and the field windings, c, are connected between the positive poles of

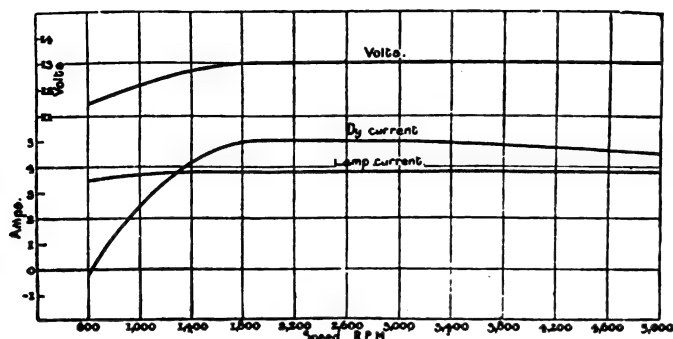


Fig. 5.

the battery and machine respectively. With increase of voltage across the brushes the difference of potential at the ends of the windings diminishes, and in consequence the strength of the field diminishes. This action rapidly proceeds to a limit above which the voltage and output of the machine under a given load remains fairly constant at all speeds. The system appears to be capable of giving good results, but possesses the serious disadvantage that a battery of twice the normal size must be carried in order that one-half may be charged while the other half is in service. Further the permanent or residual magnetism of the machine seems to prevent a steady voltage.

While only one or two methods are of any practical value for road vehicle service, a few of the more familiar are mentioned by the author as objects of interest. In one machine the armature is moved axially by a governor so that the effective magnetic field varies practically inversely as the speed. In another machine the air gap is widened or contracted

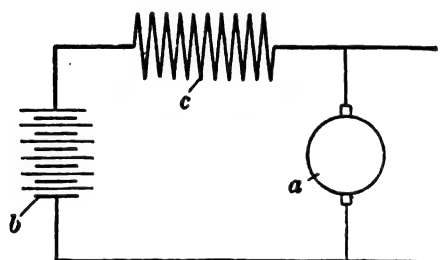


Fig. 6.—Wiring Diagram.

either by a governor-controlled hinged-pole piece or by a conically shaped armature which moves axially between conical pole pieces.

Sliding masses of iron for varying the flux through the poles have also been proposed. The idea of shifting the brushes automatically seems to have been popular with inventors, and a machine embodying the equivalent idea of swinging the machine relatively to fixed brushes has been notified in the press, if not actually put on the market. A very common method of regulation consists in the use of a field regulator actuated by a governor. This is undoubtedly a simple and practical procedure, having one or two possible advantages in its favor, but the difficulty appears to reside in the production of a sufficiently

simple regulator capable of withstanding the conditions experienced on the roads..

The most important of mechanical devices hitherto produced for regulation purposes are those depending upon a slipping drive. These are divided into two classes which are characterized respectively by constant torque and constant speed. Engineers have long been familiar with the constant torque Stone machines of England which employ a slipping belt. While the Stone has been extensively adopted for railway trains they have not proved equally adaptable for automobiles. In the first place it is expected that lighting dynamos on automobiles will be eventually direct-gear driven as is the case with magnetos at the present time. In the second place the constant torque is wrong in principle because of the fact that should the mechanism be adjusted to slip under full load at a given speed, the speed will increase at once if the load is reduced resulting in an increased voltage.

Constant speed clutches usually consist of a gov-

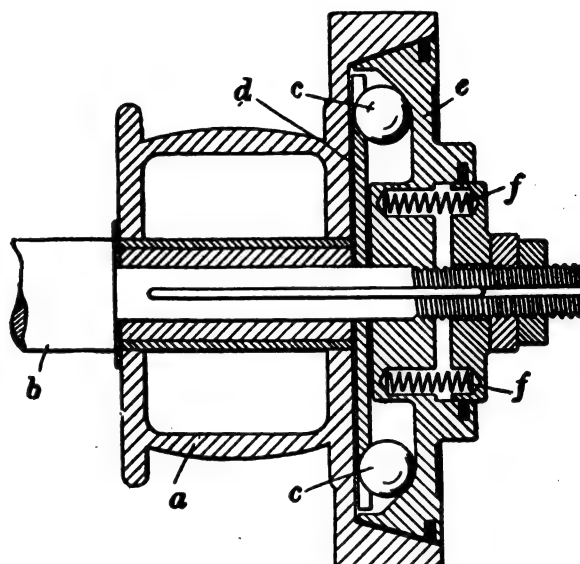


Fig. 7.

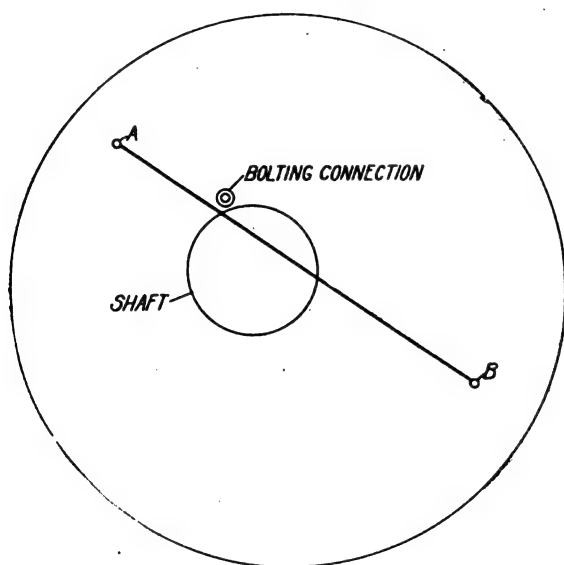
ernor-controlled clutch, generally of a friction type. Fig. 7 shows a section of the Lucas clutch, in which a driving pulley, a, is arranged to run freely on an armature shaft, b, and is shaped at one end to contain a number of free governor balls, c. The latter are supported in slots in plate, d, which is keyed to the armature shaft, and bear against the inner surface of a clutch element, e, secured to the shaft with a sliding key. The inner periphery of the pulley is shaped to correspond with the outer coned periphery of the part, e, and between the two surfaces is a thin rim of vulcanized fibre. Springs, f, keep the clutch in action. At and below a certain speed, the mechanism revolves as one piece, but above that speed the balls, by their centrifugal action, relieve the pressure of the springs on the clutch surfaces and enables slipping to take place. The balls are connected to the driven part of the device.

Jerkiness of action is a common fault in slipping clutches at the critical speed owing to the difference between static and kinetic friction, and a drop in speed is often experienced at the instant when slipping begins. Lucas has avoided this trouble by ample lubrication of the surfaces so that they are always separated by a thin film of oil. By this provision, the instant at which the slipping occurs becomes imperceptible and a smooth action is obtained.

The Brush Ignition Trouble.

From J. B., Michigan.—No. 804, March issue: If Mr. Jones has an exposed spring and firing pin timer on his 1911 Brush I believe he can eliminate his ignition trouble by inserting a strip of copper or brass, from 1-32 to 1-16 inch thick, between the spring and tension or firing pin. But first he had better remove the timer and solder a strip of copper from the pin marked A in the illustration to pin marked B, so as to insure a connection. Of course the strip to be soldered from A to B should be put on the reverse side or side nearest the motor. Then if he will remove the hand-hole play from the top of the engine, cleaning out the carbon, and see that his battery connections are tight and the batteries O. K., I believe he will have no further trouble.

My experience has been that a Brush will pound and knock badly if it misses explosions, due to excessive heat. If the gases fire each and every time, there is



not an easier working or cooler motor that I have seen, but "missing" will put it out of business as quickly as any trouble I have ever experienced. The firing after the switch key is removed is due probably to excessive heat caused by faulty ignition.

Use plenty of oil. Clean the carbon out of the motor as often as it commences to knock (it takes but fifteen minutes); use graphite around the threads on the cap to insure a tight joint and you will have no engine trouble.

For the Side Curtains.

From C. M. Wheaton, Ohio.—I notice in the March number an item from J. A. F., stating how he carries side curtains. I think I have a better way. Did you ever get your curtains out just as it begins to rain, and then stand and wonder which are for the right side, and which are for the left, and all this time the rain coming down harder and harder? I have, and that is the reason why I had the following holders made: Have the tin-smith make you two tubes out of sheet iron, 5 inches in diameter, and 22 inches long, one end closed. For the other end have a slip cover made which can be fastened in by riveting a loop on the center through which a strap will pass. Have one end of the strap riveted to the side and end of the tube. On the other side have a buckle. Roll all the right side curtains up and put in one tube and the left sides ones in the other. For a place to carry them, it will depend on the car. My machine is an E. M. F. and there is just room over the back springs,

and under the back seat. They will project out about three inches, but as they should be enameled the color of the body, they hardly show. Bolt them from the top to the seat. Now when you want the curtains in a hurry for the right side, just jump out, go around behind the machine and open the one on the right side, and there you have them without disturbing anything in the car or anybody. I would not carry my curtains any other way, if I had to bolt the tubes on top of the fenders. They can be made and painted for a dollar. If your tinner can't understand what you want, send me a dollar bill and I will have the tinner that made mine send you a pair.

[Mr. Wheaton's address is Sunbury, Ohio.—Editor.]

Another Method of Carrying Curtains.

From Henry C. Daboll, New York.—In reply to your Connecticut reader, page 61, February issue, in regard to best method of carrying curtains when the top is up, I would like to say that I was annoyed the same way for one year. I find since buying a steel tool box, 18x8x9 inches, and bolting the same upon the running board as is used upon so many cars for tools, makes a very convenient place to store curtains when not in use. My way is to fold them nicely and then make in a roll all the curtains on the right side of the car. Place in the back side of the steel box. Now take the left side of the curtains and place in the front side of the box. When properly folded and rolled they can be placed in a small space. Very many tools, wrenches, hammer, etc., can be carried in addition in the bottom of the same box. This method has been very convenient to me besides when a shower approaches one can put his hand upon the one that belongs on either side of the car. I have been soaked before now, in picking out the right and left curtains in an instant when not rolled separately and placed in a curtain bag in the rear of the car as I did for some time.

I use a Buick car with a round gasoline tank under the front seat, and a very convenient place is made for carrying tools under this seat by taking a piece of strong cotton duck (a good grain bag will do) and tacking securely to the framework on the back of the seat. Let the loose fold drop over the tank; drop down between the tank and the seat as low as the bottom of the tank, bringing the loose end back and tacking to the framework on the front side of the seat, care being taken to bring the ends up and fasten at the end of the seat or tank.

This makes a convenient place to carry tools not needed every day, although if one meets with a puncture he will probably have to resort to the store room in the rear seat for an extra tube, this being the most convenient place to carry extra tubes. A circular hole can be cut in this duck bag over the filling hole in the gasoline tank. Where square tanks are used this device cannot be used for tools.

Clutch Pedal.

From E. J. McCall, New Jersey.—Longlegged people will find it cramps the left foot to have to hold it against the clutch pedal ready for action in traffic, for example. When the clutch is "in" the pedal is at its farthest point back, about two inches further back than the brake pedal. This can be altered by driving out the pin which holds the clutch pedal on the shaft, and after heating it near the shaft hole to bend it forward when hot. Do not bend it forward more than two inches. Owing to this alteration it will be necessary to lengthen the slot in the floorboard to allow the pedal to operate freely on low gear.

For Carrying the Curtains.

From "Another Reader," Massachusetts.—"Reader," on page 61, February issue, asks for suggestions regarding carrying curtains on his car. I have a Stevens Duryea Model R touring car, and resorted to this method: I removed all the floor boards behind the front seat, bringing into sight the two rear "cross members" of the frame, and upon these two members I fitted a whitewood board $\frac{1}{2}$ inch thick, and of sufficient length to bear halfway on the lower lip of the frame, about 28 inches long by about 20 inches wide, not quite reaching the hot muffler, passing over the differential case through this floor was cut an elliptical opening over the differential case in order that room be provided for the vertical motion of the car, and over this hole was tacked a piece of strong canvas. At the muffler side of this floor board is a lip of $\frac{3}{8}$ inch wood about $2\frac{1}{2}$ inches wide, that fits between the false and true floor. This device should be made so it can be easily removed, be painted and when finally inserted, the floor boards are to be replaced from the rear forward, and screws put through them sufficient to keep the "box" in place, also using an iron angle or two, but leaving a sufficient number of loose boards to enable packing. This provides a space about $28 \times 20 \times 2\frac{1}{2}$ inches and has carried my curtains thousands of miles, and has kept them clean and unrumpled.

A Whining Sound.

From Sidney Prince, Massachusetts.—To any car owners or drivers who are at a loss to account for a whining noise that seems hard to locate, let them take the cover off the half time gears and see if the large gear is of fibre. If it is they will find that the fibre has become so soaked in oil that the expansion has caused the teeth to swell and bind in the mesh with the smaller iron gear. The forcing of these teeth in mesh causes the whine which has puzzled me for a long time to find. Have the fibre gear recut.

Good for the Hands.

From E. K. Taylor, California.—Let me suggest that to comply with the maxim "He who comes into a court of Equity must have clean hands," I find it necessary to keep a store of yellow cornmeal in my launch and garage. Automobile grease and plumbago have a greater affinity for cornmeal than for cuticle, hence a lather of soap and cornmeal rubbed in until nearly dry and squeezed under the finger nails, will, when the hands are rinsed in cold water leave them cleaner and softer than can be accomplished by the use of any chemical compound.

Grease Working Out of the Differential.

From S. H. Bevins, New York.—Permit me to reply to one question (825) by Joseph Reindl in the March number. He complains of grease working out of the differential on his Ford car. I drive a Ford car and met with the same trouble. I had the wheel taken off several times by those who claimed to be experts but without any beneficial result. I also used the heaviest grease that I could obtain. I then saw in your journal a remedy tried by one of your subscribers, that was to drill a $\frac{3}{16}$ hole under and through the housing of the rear axle, about 12 inches to the right of the differential. I did that and had no more trouble with grease getting into the brake band. Of course you want to keep the rear axle well supplied with grease through the grease cup and not depend upon it getting oiled from the differential as the excess grease oozes out of the

hole and don't get into the wheel. I also use heavy grease in the differential.

The Stoddard "20" Push-Rod Knock.

From Wynne L. McDougal, Oklahoma.—In relation to the Stoddard push-rod knock mentioned some time ago, it seems that when the first cars of this type were built, the push-rod guides were fitted a trifle loose and a slight rattle was perceptible. To overcome this these were made a closer fit in the cars built later. I have noticed in a car or two, that there is a knock that sounds similar to the click of a lax push-rod adjustment, though louder, and is more often re-occurring than constant. This is caused by a push-rod sticking in the guide so tight that it will not "follow the cam." The plate holding the set of push-rods containing the offender should be taken out and that one worked down until it is a true fit. Care should be taken though not to get it too loose, for if it is it will chatter. Allowing the oil level to become a trifle low will also set up an intermittent knocking in the oil-pump.

Compression in the Buick.

From E. B. Chalk, Kansas.—In reply to your No. 793 in regard to his Buick car will say that you made a good guess as to the trouble.

In the first place the lack of compression as you say; probably caused the trouble. That hole that he found in the manifold and soldered up helped to make the trouble. The hole is found in all Buick F models and is there to prevent flooding the cylinders. I once saw a man solder this hole shut and he was unable to start his machine. The fact that Mr. Kiltz is able to start his machine at all after this hole was stopped makes me think that his manifold leaks somewhere near the guilty cylinder. The hole he found, being equi-distant from both cylinders did not affect the mixture but a hole nearer one cylinder than the other would. If he will balance the compression, make sure that his manifold does not leak, and open the hole he has stopped he will probably stop the missing.

Simple Cars and Carbon.

From E. J. G., Schenevus, New York.—I am glad to see some waking up to the knowledge that an auto can be made that is not so intricately and inconveniently put together as to require a force of men and a machine shop to make a simple adjustment or repair, and the wise maker ought not to be a robber on repair parts of his own cars.

I nearly forgot something: Try, for scraping carbon, getting three or four pieces of soft iron wire about the size of a tenpenny nail or a little larger, and flatten about $\frac{1}{4}$ inch fan shape on one end and bend to right angle or nearly (hoe fashion). Then you can bend the shank, which should be 12 to 18 inches long, into most any convenient shape to reach through any openings there may be in the top of the cylinder, and by keeping the "hoes" sharp you can often do a good job and not injure the piston or cylinder.

What Caused the Loss of Power.

From B. M. Taylor, New Hampshire.—Two years ago I started from Bridgeton, Me., to Conway Centre. I stopped to escape a thunder shower. The car ran all right when I stopped but when I started after the shower I had no power. It would just barely creep along and I was at a loss to know what the trouble might be. However, I made out to get to Conway and then when the engine cooled I began to look it over and very

soon found the difficulty. It had a two-cylinder engine, and one spark plug had become loose, or rather the little brass ring that turns down on the porcelain had become loose so I did not get the spark into the cylinder, but I was then so green that I did not know that this made me run on one cylinder. I turned the brass collar down a little so as to tighten the porcelain and trouble was then overcome. That is all the difficulty I have ever had. I have had punctures, but all must expect these. I have put in one new tube, but otherwise the car has on the same tires as when I first bought it.

That Missing Brush.

From W. U. Taylor, M. D., New York.—If Roy Jones, No. 804, in the March issue, will have a priming cup put in the cap over the exhaust valve, and about once a week, when his engine is hot, pour a cup of kerosene and alcohol, equal parts, into the cylinder and allow it to stand a few minutes, and then run the engine a few minutes, he will cure most of his troubles. His mixture is weak. A miss, that is very hard to locate, is usually due to an excess of oil working along the cam shaft to the timer. A little kerosene on the valves and timer will stop that miss. Mr. Jones should give a little more than the exact amount of gasoline to make the engine go "just right" on the neutral, or there will be a lack of power when under a load. With the Buffalo carburetor, I open the air as far as it will go, then change the needle valve until I am fairly suited. If the engine does not work as well the next day, I leave it alone, and the chances are it will run better than ever the third day.

Grease From the Rear Hub.

From J. W. Miller, Kentucky.—In regard to the trouble that No. 825 is having with the oil running out of the rear hubs in his Model T Ford, I have had the same difficulty, and here is the remedy: Keep the universal joint case well filled with heavy grease through the compression grease cup on same. This will prevent the cylinder oil running back through the shaft case to the differential. To get out the thin grease that he has in the rear axle housing it may be warmed. Should he let the engine oil get through again he will find relief by drilling a one-quarter inch hole half-way between the differential and the rear wheel on each side in the rear axle on the lower side.

In regard to starting the Ford car in cold weather, all that is necessary is to prime at least two cylinders and let it stand for a minute or even longer, and then it will start every time.

The Brush Carburetor Trouble.

From W. U. Taylor, M. D., New York.—The trouble of No. 834, in the March issue, is too much for me with the exception of the breaking of the spark plugs. That, I think, is from cold. I thought three years' use of a 1909 Brush car had taught me all there was to learn, but running it in zero weather made a post graduate course necessary. A little ether to the gasoline for priming cured the hard starting. The dry cells needed thawing out a few times to get the amperage up to the mark, and a hot air pipe from the exhaust to the carburetor completed the cure.

For the Stuck Pistons.

From J. T. Edwards, Michigan.—Replying to J. C. De Puy, 808, in a similar case I finally thought of using hot water and expanding the cylinders. I filled the

radiator and engine with boiling hot water. The first filling did not seem to do any good, so I drained the engine and immediately refilled it. This time it was successful and I got her turning over O. K. I took the engine down and found that the rings were inclined to stick with carbon and thick heavy oil. In a similar case with a portable engine I took the cylinder head off, saturated some waste with kerosene, fired it, and expanded the cylinder in that manner.

Hot Water for Starting.

From A. L. W., New York.—In your last issue I read that some of your patrons had trouble in starting their car during the cold weather, and some one suggested to pour hot water over the carburetor and manifold. This may be a good remedy for a car that has been in use for some time, but not for a new one when the bearings are tight and the oil gummy. I have five cars and they are all stored in a garage with no heat. For a very cold night all the water is drained off and filled up the next morning with hot water. I have heard many times that it would crack the cylinders, but so far have been very successful, even during the coldest days we have had this winter.

The Splitdorf Coil.

From H. C. Dessor, New York.—Under inquiry No. 762 in your January issue, Mr. McIntyre asks for information with reference to the Splitdorf low tension magneto and coil. He says that he "cannot get a spark at the plug from either the battery or magneto." My experience may help him. I have driven a Mitchell car for the past three years, equipped with the same ignition system. Last summer, while driving along a comparatively smooth and level road my car stopped, and I could not start the motor again, even with the assistance of friends and a man from the garage. However, it did not take long to discover that there was no spark at the plugs, but could assign no reason, as the wiring, magneto, breaker box and batteries were all in good condition. I experienced the humiliation of being towed home. After another thorough examination of the ignition system, I was forced, by a process of elimination, to the conclusion that the trouble must be in the coil or transformer on the dash, but as I had been informed by the Mitchell and Splitdorf people that it was practically impossible for anything to go wrong with the coil, barring mechanical injury, I was very loth to take it off. This type of coil is sealed at the factory and one cannot inspect its wiring or connections. I sent the coil to the factory and they returned it to me in a day or two, without charge, and when replaced and connected, the motor started without trouble, thus proving that the "practically impossible" had happened.

When removing the coil from the dash I would suggest that the wires be carefully marked, as a mistake in connecting it up again may result in a burned out coil or armature.

I beg to call attention to the vague instructions you give this novice in answer to his question. You state that "if you will, with the switch in the battery position, touch the binding post on the magneto that runs to the switch with one end of a short insulated wire * * *." Now, there are three numbered binding posts on the magneto in question, two on the breaker box and one on the instrument, but no wire runs from any of these connections direct to the switch. On the bottom of the coil there are also three connections (not counting the high tension terminal), numbered to correspond

with the magneto connections. There are also two connections on the top of the coil to which the battery wires are attached. Will you therefore kindly inform a "novice" which connection on the coil is the "primary terminal of the coil" referred to in the article.

Starting In Cold Weather.

From J. W. Rush, North Dakota.—I have two Model D Schebler carburetors and I can use anything with them. One of them is on my feed mill engine and the other is on my Oldsmobile car. I can start my mill engine when it is 40 degrees below zero, just by putting a little hot water in the tank. I use naphtha in both and I have good success. Now if Mr. E. E. E. of Idaho, will go and get his carburetor fixed up his car will work O. K. He must have a new float put in it. If it were mine I would send it back to the factory and let them fix it, as most of our experts have not sense enough to flag a hand car if it was about to run over them. A new float will cost Mr. E. E. E. 50 cents at the factory and the valve may need to be ground.

Parts for Yale Cars.

From the Ayer Automobile Station, Ayer, Massachusetts.—In your paper for March we notice an inquiry about the Yale car. We would advise you that we have one of these cars and we would sell the motor or the parts.

Among others who have written they have Yale car parts to dispose of are the following:

B. Franklin Futer, 215 North Prince street, Lancaster, Pa.

A. J. Gredell, Ursa, Ill.

George Schlappig, Reinholds, Pa.

Will Some One Kindly Reply?

From C. H. Gragin, New Hampshire.—I would like to ask through your columns if any of your readers have ever built four-seated coach enclosed side entrance, if so how they arranged the middle seat as it would come in the doorway. It would have to be so it could be gotten out of the way to get in front or hind seat, front seat facing back.

Also I would like to hear from some one who has built covered top for automobile for grocery store purposes.

Estimating for Repairs.

In a great many cases it is necessary to estimate for the cost of repairs before the work can be put in hand. In order to be able to do this with any degree of safety, it is necessary to make a very careful examination, and often to take the car either wholly or partially down. If, after this is done, the order is not secured, it would represent a considerable loss to the repairer, as the car must be put together again just as carefully as if it had been repaired—if it is in usable condition—and will probably be used again before being repaired.

A repairing firm cannot take the risk of losing money in this way, and it is, therefore, absolutely necessary to specify a certain sum which the owner must pay for estimating if the work is not placed. The owners of cars do not like the inclusion of this clause, but it is doubtful if it can be avoided. It is really for the owner's protection as much as that of the repairer, as, if an estimate is given without careful examination, it is generally more or less a shot in the dark, and either the price is fixed far too high, in which case the owner suffers, or too low, in which case also the owner also suffers, as the repairer, like anyone else, does not like working at a

loss, and does no more in a case like this than is absolutely necessary; while in car repairs, as is well known, there are always a number of small items that crop up in carrying a repair through, which, while not specified, add very greatly to the satisfaction that the work will give if they are done.

Welding Is More Common.

It would not be too much to state that the use of auto-genous welding has revolutionized motor vehicle repairing. Parts which only a few years ago would have been thrown away as useless are now, thanks to the acetylene blowpipe, repaired and again put into use.

Starting first with the repair of cracked cylinder jackets and burning on broken lugs to castings, the use of the blowpipe has gradually extended until almost any work seems possible with it. The repairing of broken crank shafts is now quite a usual operation, and it is very seldom, if the work has been properly carried out, that the shaft breaks again at the welded place.

Welding teeth into a gear wheel; welding up a pressed steel frame after a breakage, or after having been cut to extend wheelbase; welding on a scroll iron broken off in an accident; welding brackets on to frame, etc., are only a few instances of what can be done. There are still many cars about with gear wheels solid with the shaft. In the event of one of these wheels breaking it was necessary to scrap the whole shaft, as it was often impossible to flange or key the new wheel on. Now a new wheel can be built up on to the shaft turned up and cut, and the shaft is as good as new.

There is one metal which has been found impossible to deal with satisfactorily by welding, and that is aluminum. This, unfortunately, is the metal in which the most breakages are found in motor vehicles.

Neglect by Tire Users.

The United States Tire Company's western manager says: "Adjusting departments of big tire concerns claim (and they base this claim on careful and close-range observation) that about fifty per cent. of the tires that are discarded, unfit for service, are not actually worn out, but deteriorate through abuse or neglect, or perhaps both.

"Whether or not we accept this 50 per cent. estimate of tire waste in its entirety the fact remains that in America each year enough money is actually thrown away through this channel to finance a couple of nations.

"When a man makes up his mind that the moment has arrived for him to invest in an automobile he usually loads himself down with a varied assortment of advertising literature covering every detail of the machine—excepting the tires. As a result when Mr. Motorist finally selects the car that seems best suited to his requirements and his pocketbook, he is rather well posted on its mechanism and can give an obstinate engine a very logical argument.

"But chances are better than ten to one that in his wide quest for advance information on the subject of automobiles the motorist entirely overlooked the tires.

"So he travels blissfully along letting his tires take care of themselves until eventually they rise up in effective protests against this neglect and new tire equipment is required. Then, unless the motorist, either through intuition or from outside sources, has absorbed the idea that tires really do require some attention he buys another set and proceeds to do the same thing over again. The result is that this motorist is very apt to be a victim of incessant tire trouble and may be heard constantly complaining about the size of his tire bills."

Taking Up the End Play of Front Wheels.

In view of the rough roads which a car is often called upon to traverse, and their slippery nature in wet weather, it is obviously an unfortunate thing to have a pair of front wheels which have an eccentric motion on their own account, and therefore if there is any end play on the front wheels it is advisable to see that this play is taken up at the earliest possible opportunity. Where these wheels are fitted with plain brass bearings this is by no means so difficult a job as at first sight appears. On one occasion when a car had been overhauled some new bearings had been fitted to the front wheels, but were not made long enough. Hence when they were fitted and the front wheels put on there was a good deal of end play. The driver of the car found that the best way out of the difficulty was to turn up two brass washers just thick enough to take up the end play. This, of course, was not a perfectly satisfactory way out of the difficulty, because although when the washers were fitted the bearings were practically the same as if they were in one piece, the bearing surface of the thin washer would not stand the wear and tear the same as a bearing in one mass would. As a matter of fact the washers had to be attended to again after the car had been driven 2,000 or 3,000 miles, but the fitting of these washers made a satisfactory job for the time being, and it was an efficient means of not only taking up end play but also of preventing grease from oozing out of the bearings. This is not recommended as an expedient for everyday practice, but it is given as the best way that could be adopted out of the difficulty under the circumstances.

To Carry Spare Coats.

It is often a convenience to carry a light rainproof coat or some other odd wrap for use when leaving car, as a motor coat is too heavy for wearing then except in the bitterest weather. Carrying spare coats on a car is, often bad for the coats, as they kick about in the bottom of the car, and are more or less used as mats. The best plan for taking a few things of this sort is to carry them in a large bag. Two or three coats neatly rolled up can be put in a bag of this kind, and it can be tucked away in some corner of the car without the garments suffering to any serious extent. A bag of this sort, by the way, is also the best thing in which a suit of overalls can be carried. It is well to remember that if they are allowed to get too dirty they do not serve their purpose of protecting one's clothes.

Read the Advertisements.

There is abundant evidence that a good many of our readers consult the advertising department regularly, but we are inclined to fear that some subscribers fail to estimate the value of the advertisements properly.

While the low subscription price of most periodicals, including *The Automobile Dealer and Repairer*, is due to some extent to the low postage rate, at the same time no periodical could be printed at the present subscription rates except for the advertisements.

They reduce the cost of periodical literature to the great reading public and they provide the publishers with what little profit they get.

"Getting rid of the used cars taken in trade is one of the hardest problems that some of the automobile dealers have to contend with," says C. T. Silver of the Overland car.

THE CARD SYSTEM.

How It Is Useful and an Economy for Dealer, Garage or Repair Man.

From G. D. Crain, Jr., Kentucky.—Every automobile dealer knows that certain items of stock, such as batteries, tires, etc., have a habit of evaporating in the strangest way until they are nailed down. The best nailing-down process ever devised is a system which will indicate where each specific item is and who has it. Losses through the leaking out of material and accessories because of carelessness in handling valuable stocks may be so large, otherwise, that the dealer will have trouble in squeezing running expenses out of his business.

One of the biggest houses in a large city of the Middle West used to carry a large stock of tires on the main floor. They were arranged in piles according to sizes, the display being for the purpose of impressing the prospective purchaser with the fact that the dealer was carrying a stock sufficient to supply any possible need. That part of it was all right; but somehow or other the stock went down more rapidly than sales justified, and inventory time usually found him

Princeton ○ № 952

Name _____		Date _____	
_____		Purchased _____	
INSTRUCTIONS: _____		Finished _____	
_____		_____	
Received _____		Delivered by _____	
O. K. _____		Date Delivered _____	

For Goods Received.

short from two to half a dozen tires. Losses assumed such proportions that something had to be done.

Something was done. It consisted of carrying absolutely no tires on the floor of the salesroom. They were all stored in the basement, which was cool and dark, and which was the best possible place for the tires anyway. The deterioration in this way was reduced to a minimum, whereas their exposure to sunlight and steam-heat upstairs was bound to have had a bad effect. So the new system of storage was beneficial from this standpoint alone.

In order to make it unnecessary to trot up and down stairs every time someone wanted a tire, for the purpose of looking through the stock and seeing what was on hand, the dealer devised a simple but effective card system for the purpose of tabulating this information. A triplicate card was used, the original being attached to the tire itself; the second went into the safe, being for the purpose of use in case of fire loss; while the third went into an index kept for the purpose of listing stock.

If a buyer came into the store and asked for a 34x4 tire, the file was referred to and the fact that the tire wanted was in stock was noted. Then it was sent for, the tire delivered, and the ticket attached was taken off and signed by the customer. Then it was turned over to the bookkeeper for use in making out bills, and was an effective record in case of dispute as to whether the tire had been delivered or not.

When the office got the original card showing the sale, the other two were withdrawn from the safe and

This plan proved so successful that it was applied

[illegible]

to articles like gas tanks, batteries, etc., which chauffeurs from time immemorial have had a habit of "borrowing" and then forgetting to return. Each of these is tagged as in the case of tires, and when a sale is made or a loan is authorized, the person receiving it signs the ticket. Thus the dealer always knows where every tank and battery he owns is, and if no return is made, a proper charge is entered for the goods. This plan has saved him hundreds of dollars, for he had learned by experience that his purchases of stock for this department were always in excess of sales.

[illegible]

are left by owners for storage purposes, the owner gets one of the cards, as a check, another is attached to the goods and the third goes to the office. When the goods go out, the two cards are returned to the office and the three joined and made a part of the permanent records. If goods are lost while in storage, the fact is shown because the office has one card and the owner another. As the cards are numbered, this system has not infrequently aided in leading to the recovery of stolen goods.

Another is a record of the work done, and on the completion of this it is deposited in a box and returned to the office, where the third, showing the owner's name, date the goods were received and date promised, and other facts, has been held. The working card indicates when the goods are ready to be delivered, and thus at any time, if any owner calls for work, reference to the repair file shows whether the second card, indicating the completion of the job, has been returned. If it has been, the work itself is sent for, the card is signed by the owner and the three cards joined and turned over to the bookkeeping department for the purpose of entering the proper charge.

This method also applies to charging batteries, etc., a card returned from the garage indicating whether the work has been completed. Similarly, goods returned to the factory are taken care of in the same way, an office record corresponding to the ticket accompanying the goods indicating whether the material has been returned or not.

This system, besides making it impossible to lose track of anything and therefore preventing losses, also enables details of work to be handled without friction and with absolute certainty. Instead of asking the shop foreman whether a certain job is ready, when the owner calls, all that is required is for the office employe to refer to the file. This shows at once whether the work is ready for delivery, and the moments saved by this simple system may be profitably employed in productive labor.

Vari-colored cards are used for the different purposes for which they are employed. Red tags go on tires, batteries, gas tanks, etc.; green are used on repair jobs; and white for check-room and factory-return items. The plan is not only effective, but employes have no difficulty in using it, and on the other hand are glad to have some such method of recording information. Memories are not so heavily taxed and goods are better taken care of than when a haphazard and undependable means of keeping track of things is used.

According to our vice consul-general, the agency of a prominent American automobile was recently given to a Singapore, India, garage. This car is built on the latest lines, one particular feature being the straight line from the top of the radiator through to the back of the car, which has been sought after in many of the up-to-date models. A supposed cut of the car appeared in the advertisement in a local paper. This cut was of an older model of the same car and did not show the above feature, which is so attractive to this market. The point meant to be emphasized is the failure of the manufacturer to provide cuts showing the latest models. This is a very small thing in itself, but may in many cases influence orders.

As the consul-general states, the matter is not of great importance, but it shows that people in India who buy cars are quite up-to-date and want the latest models. But, paraphrasing the well-known lines of Tennyson, "better fifty years of prosperous Massachusetts, Connecticut, or almost any other of the United States, than a cycle of Cathay (India) for selling automobiles." All the same, it is gratifying to know that the American automobile is finding its way all over the civilized and even into the uncivilized world.

A vigorous campaign against the indiscriminate use of the muffler cut-out is being conducted by the Abbott-Detroit Motor Company.

THOUGHT IT WAS THE MAGNETO.

But It Proved to Be Improper Firing that Caused All the Trouble.

In "Ignition and Accessories" for February, C. E. Kendall gives the following personal experience which may be useful to others:

Some few years ago I was running a garage and driving a car for a wealthy merchant in a small central Illinois town.

While the car was of a good standard make and had been out but one season, it had received rather poor care and plenty of hard use and abuse. So it was no surprise to find new symptoms, the effects of mistreatment, cropping out now and then. However, after operating the car a short time I grew to know her moods and we became very good friends.

Early one bright, balmy autumn day, the owner called up and said he wished me to drive the car to a small town some fifty miles distant. The day before I had overhauled the car, and everything was in fine shape, but just before starting decided to have one last look at the spark plugs. To remove, clean, examine and replace them was not a very lengthy operation.

The distance from the garage to my employer's house was not great, so I ran up on batteries. After leaving the house and running about a block I switched on the "mag." Nothing doing. A grumbling jar, a noticeable slackening of speed was all.

With an impatient comment about an N. G. magneto on a good car, I switched back to battery and we proceeded on our way as merrily as before.

A recital of my many trials to get the magneto to do its work, my thoughts and words about it—to say nothing of those of the owner—would perhaps make interesting reading; but I haven't the time nor yet the heart to record them. All the way down and about half way back to the car ran splendidly when on battery. But as soon as I tried the magneto—nothing stirring.

About six miles from home the motor began missing; not a regular marked missing in any one cylinder, but a rather erratic missing in first one cylinder and then another, and then perhaps every cylinder would hit correctly.

In a short time the missing became more marked and only one or two would hit. I then became suspicious of gas supply. Upon examining this function and finding a plentiful supply, I naturally attributed the cause of my trouble to weak batteries.

The last three miles, as they slowly rolled by with their accompanying starting, stopping, jerking and the occasional musketry of back-firing, are so well impressed on my memory that every little detail, even to the spontaneous outbursts of words, is vividly recalled with little effort.

My employer was one of the town's most influential and successful business men and somewhat fond of "putting on the rag." I was considered one of the best auto men in that country. So you will be able to see that our chagrin and anger were mutual and that funeral pace, irregular firing and occasional loud back-fire, up the main street at ten o'clock at night was no more to my liking than his.

After leaving the people at the house I ran into the garage, switched on the lights, pulled on my trouble clothes and swore there would be no sleep that night until the magneto was fixed and running right.

Removing the hood I started to loosen the high

tension wires. And there, as large as a country sign-board, loomed up the cause of my trouble. Removing and exchanging the high tension wires on cylinders 2 and 3 I started the motor and ran the car out and around town on high, reverse, intermediate, or at a snail's pace on low; magneto or batter; with never a miss and never a sound.

The jar, slackening of speed, loss of power and back-firing all had a message of improper firing order for me, had I but read it.

There is an old saying to the effect that if you think and believe a thing long and strong enough it will eventually come true. Such was my case. Having had so much trouble and having gotten so used to what I regarded as the misbehavior of the magneto, that apparatus became the actual source of all my grief, innocent as it was.

When auto trouble troubles you never give anything the benefit of the doubt, but go ahead and find out, so that you are positive as to what is causing the trouble. It is usually found that some simple misadjustment, some slight accident causes a great deal of trouble and worry and the average man will blame the manufacturer, the designer, the shop, only to learn the fault was all his own.

Tire Contest Suggested.

"Interesting as are the results of auto contests and speed trials today," stated Mr. F. E. Moskovics, Sales Manager of the Remy Electric Company, Anderson, Ind., "just as interesting were the results of contests to determine quality, held in earlier history of the automobile. Senator Morgan, who promoted many speed trials the past few years, in 1905 promoted an auto Carnival at Long Branch, New Jersey. Among other events was a contest to determine the efficiency of the various makes of tires under absolutely alike conditions. In arranging for this contest Senator Morgan went into the open market and purchased six sets of tires of different makes. He obtained the co-operation of Mr. Benj. Briscoe, president of the U. S. Motors Co., who furnished him with six Maxwell cars of the same type and equal weight. The six sets of tires were weighed carefully and placed on Maxwell cars which were then set to running, night and day, over the same course and at the same speed. At the end of the run the tires were again weighed and thoroughly inspected. The judges, in making the awards, took into consideration delays caused by punctures, and, in fact, any defect that would tend to delay the car. The set of tires showing best under these conditions was chosen the winner of the contest. The data gained from this unique event was very valuable to the development of the tire industry. Such a contest, if held today, would probably arouse as much interest as it did in 1905."

Tire Cuts.

That a small stone should have lodged in a cut in a tire may appear to be a matter of little significance. But when the wheel is moving the small stone will begin to work its way slowly but surely further into the rubber. It will rub the canvas, pierce it and finally work its way right through the whole thickness of the envelope. To guard absolutely against tire destruction from this cause the envelopes should be critically examined on the return from every trip. Every cut found must be probed and every particle of foreign matter removed. If more than a quarter of an inch deep it should be repaired.

STEAM CAR DEPARTMENT

This department is intended for owners, users and others interested in the steam car.

Those who have trouble with their steam cars are asked to give clear and full particulars, and their queries will be answered as correctly as possible by an expert. It will be considered a favor if our readers will contribute to this department, giving such information as may be useful to others using the steam car.

An Unusually Fair Statement.

From L. O. F., Ohio.—In reading the January issue I see an article from G. T. P. in which he claims that the tires on a White steamer will last twice as long as on a gas car. I think the reason is that the steam cars are all oversized in tires. I do not think that it is the car's fault that the tires wear out on a gas car as quick as some of them do but from the fact that they are not tired up to the load like the steamer is. I know of gas cars of equal or more weight than my steamer that have only $3\frac{1}{2}$ inch tires while my steamer has 4 inch tires on it.

The White Co. have used the 4 inch tires since the 1903 Model until 1909 when they used the $3\frac{1}{2}$ inch on the 20 horse car. Another reason is this: All of the models from 1906 have a connection from the air pump to pump up the tires by engine power thus saving a lot of hard work as the last ten pounds of air to go into a tire is the hardest of the entire job. This does not worry the steam car owner as it does the gas car owner who must pump his tires by main strength. A tire properly inflated will last longer than one partly inflated.

After all it is not the car so much that gives the wearing qualities to the tire as the man behind the throttle that does the work. If a driver drives a car under full power up to the place where he wishes to stop and then shuts off his power and applies his brakes and makes a grand stand stop you can wager that that car will need a new set of tires very often. I have one driver in mind that drove a large car. I think the owner said that his tire cost averaged him close to 12 cents a mile. The above description was a favorite method of this driver's mode of driving.

The proper mode of driving is to shut off the power and let the car coast up to the place he wishes to stop and then to apply the brakes so as to stop the speed of the car gradually when the car will come to a stop without any extra strain on the car or tires. There is only one time that a driver is justified in shutting off his power and jamming on his brakes and that is to slide his wheels in an emergency when life or limb is at stake. Another hard thing on tires is to leave the weight standing on the tires when the car is not in use every day. The car should be jacked up and blocks placed under the axles at the spring seats to support the weight of the car and keep it off the tires.

I would like to see a test made with a White Steamer and a gas car of equal weight and load with equal sized tires over the same road at the same speed per mile and then see which set of tires stood the test the better. This would end this controversy about the wearing qualities of the tires on the two kinds of cars.

There is one thing that I would like for steam owners stop, and that is drawing comparison between the steam and the gas car. It does the steam car no good and does the gas car no harm but creates a feel-

ing against the steamer by the gas car owner. The gas car has its friends and place and is the accepted power by most of the automobile owners and drivers.

The steam car is fine for a pleasure car and for touring in a hilly country where a change of gear would have to be made often with a gas car. The steam car is not a cold climate car for winter use unless it can be kept in a warm garage. It is too much trouble to drain it every night as no anti-freezing solution can be used in it.

I myself prefer a White Steamer to a gas car as I only use a car for pleasure and can take the time to get it ready for the road. Have owned both steam and gas cars and am like the old saying of "Everybody to their likes, as the old woman said when she kissed her cow."

Let all owners whether gas or steam quit knocking the other fellow's car and get busy boosting for good roads so that we can get more use with less trouble from our cars. I hope more steam owners will state their troubles or experiences through the Steam Car Department for by trouble you learn and experience is the best of teachers. I seldom read of the troubles of any steam car owner but what I get some benefit from the article. I hope that the editor will be patient as we all have our likes and dislikes and some express them in stronger terms than others do. We are all liable to make mistakes so please overlook some of our shortcomings.

Burner Troubles.

From A. N. Henshaw, New York.—In reply to the inquiry of Mr. Green in the March number, no air should enter the Stanley burner except what comes through the mixing-tubes. Owing to the intense heat to which they are subjected, burners occasionally need repairs, or even replacement. If the casing has been burnt out in places, or badly warped, air will leak in and cause repeated backfiring. The same will happen if the cement plastered around the edge of the burner, where it fits under the boiler, has dropped off so as to admit air. This can be remedied by stopping the place with asbestos cement, which can be bought at the plumbers, or furnace cement. Leakage of steam into the burner is another cause of backfiring, and this is perhaps what ails Mr. Green's car. (See page 74 of the March issue.) This can be determined by removing the burner and pumping up two or three hundred pounds water pressure with the hand water-pump. As the trouble begins when two hundred pounds steam pressure is reached, this ought to be a sufficient test. It is possible to ruin a good boiler by carelessness in allowing excessive water pressure to be applied. A slight leak in one of the superheaters will also cause backfiring, and is sometimes a warning that a superheater will soon have to be replaced.

Steam Car Improvements.

From H. Leidtke, New York City.—I fully agree with our neighbor, the Englishman, on what he has to say concerning a White steam car.

There is no question about this car being able to go anywhere, but to my mind it is complicated to such an extent that most people who are not mechanics themselves are afraid to tackle one. I think any steam car with a fire tube boiler is the best car. In the first place, there is always a reserve pressure of steam to rely on, and they usually have less mechanical parts about them. For instance, as in the Stanley car, which has no change gears, no simpling device, no thermostat, nor condenser, it is simplicity itself, more so since I have attached a

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YOU GARAGE MEN ONLY KNEW THE BIG PROFITS MADE WITH A "NATIONAL" GARAGE VULCANIZER—

YOU CAR OWNERS ONLY KNEW THE MONEY AND TROUBLE YOU COULD SAVE WITH A "NATIONAL" PORTABLE STEAM VULCANIZER—

WE WOULD SOON BE SIX MONTHS BEHIND ON ORDERS.

"National" Vulcanizers have proved their superiority over all others by years of successful use all over the World. They are standard. Nearly 30,000 now in use.

GARAGE MACHINE—Vulcanizes three tubes and two casings at a time. Is heated by gas or gasoline, will not burn tires, and is the cheapest practical vulcanizer on the market. No experience required to operate. Costs nothing to get full particulars. It may be the means of bringing you hundreds of dollars—It has others. Send coupon for our very attractive selling plan. Mail it now.

"NATIONAL" PORTABLE STEAM VULCANIZERS for individual car owners. For both tubes and casings of any size. Can be used in country, and positively will not burn the rubber. Any boy can easily operate it. Will pay for itself in no time. Don't take our word for it, fill out the coupon and see for yourself. Fix up your tires at our expense. If you do not want to keep it, return it. You haven't a cent invested. Full instructions and complete outfit of supplies go with each machine. Price \$12. Beware of imitations. The words "National, Patented" must be stamped on each machine.

MANUFACTURED BY

THE NATIONAL MOTOR SUPPLY CO., 1909 EUCLID AVENUE, CLEVELAND, OHIO

Please send full description and special selling plan of your "National" Garage Vulcanizers.

Name

Address

.....

Please send for free trial a "National" Portable Steam Vulcanizer complete. I agree to send you \$12 or return the Vulcanizer in ten days.

Name

Address

.....

References

Please mention the Automobile Dealer and Repairer when writing to advertisers.

new self-recharging fusible plug. Formerly when the water got low in the boiler, and the plug would blow, I lost from 30 to 40 minutes before I could attach another plug and get water into the boiler so as to start again. Now I lose about three minutes and perhaps five pounds of steam, or plainly speaking, just the time it takes to shut off the fire, get out of the car and give a screw a few turns. By so doing I shut off escaping steam and at the same time it recharges itself. I am now installing a kerosene burner, which I am going to give a thorough test, as I think it will add to the safety of the car and reduce the fuel bill considerably. If it proves a success, I will at a later date, if allowed, give my experiences with it through this department, as no doubt it will be of interest to steam car owners.

(Note.—Mr. Leidtke's experience with the kerosene fuel will be much appreciated.—Editor.)

Cure for Steam Car Troubles.

From S. G. Rich, New York City.—A friend of mine took almost the whole gasoline system of his Stanley car apart to find a clog and could not locate it. In doing so he broke the "steam automatic" and had to spend quite a little sum for repairs and readjustment. Finally he tried blowing the burners until liquid came, although he had tried it before taking the gasoline system down. This time it helped, and a third blowing cured the trouble. I have had a similar experience to the extent of having to blow the burners twice before they became clear. Of course I blew them when hot, and until liquid gasoline came through. Cold blowing is of very little use. It is a good plan to pin out the nozzles before blowing; I have used a thin copper wire instead of a pin with good results.

I had trouble with the oiling system on one occasion. The little plunger, like a poppet valve, that goes on top of the ball of the oil pump exhaust valve, would stick in the valve-cap (or union stub). Two or three times I pulled it out, and it seemed to work freely.

I cured the trouble by filing the plunger stem down slightly, in diameter. To make sure that even if stuck no trouble could occur, I filed a flat side on the stem so the oil could get past no matter what occurred. The pressure caused by the pump's action can be relied on to close the valve, even if the plunger and spring stick.

An old Stanley car in the town where I was last Summer, would not hold its water. It blew a fusible for every ten miles' running. When the engine was down for repairs it was found that the pistons had worn so there was a gap about 1-32 of an inch wide around them. As is perhaps not generally known, Stanley cars up to 1908 had no piston rings. Rings were fitted to this machine, and it holds its water well. The wear of the pistons seems to have been due to an oil pump adjusted to feed too little oil. I am convinced that almost all old Stanley cars will be greatly improved by fitting piston rings.

I find that wiring the front license plate on to one headlight is a convenient way of carrying it. On Stanley cars it is liable to be very much in the way if put on the front of the hood, as it is sometimes done. But if this last way must be used it is easy to use the ordinary front license plate bracket. The part that goes back of the radiator cap is omitted. Two holes are put in the front of the hood, and short flatheaded bolts, with large washers under the heads, and heads inside the hood, are used to fasten on the bracket. Washers on the outside, between the bracket and the hood, do no harm.

Filling the Radiator.

From George W. Whitford, New York.—It is a good plan to let the engine run while putting in cold water in your radiator so the cold water will mix with the warm and will not suddenly chill the cylinders. At all events, this is advisable in cold weather.

Oil for Various Engines.—In response to many inquiries as to the best grade of oil to use for certain makes of automobile engines, the Havoline Oil Company of 17 Battery Place, New York, has prepared the following table which applies under normal conditions.

Use Light For:

Apperson	Halladay
Austin	Hart-Kraft
Chalmers	Herreshoff
Cole	Hotchkiss
Columbia	Imperial
Corbin (water)	Interstate
Crow	Isotta
Elmore	Jackson (4 cyl.)
Flanders	Kisselkar
Garford	Knox
Hudson	Koehler
Kline Kar	K-r-i-t
La France	Lion
Locomobile	Regal
Lozier	Reliance
Matheson	Reo
Mercedes	Rider-Lewis
Mercer	Royal Tourist
Oldsmobile (6 cyl.)	Sampson
Pope-Hartford	Schact
Peerless	Selden
Premier	Simplex
Studebaker	Staver
Thomas Flyer	Speedwell
Stoddard-Dayton	Velie
Winton	Warren-Detroit
Gaeth	Wayne

Gearless
Glide
Grabowski
Great Smith

Use Medium For:

Abbott-Detroit
Acme
Aerocar
American
Amplex
Anhut
Autocar (4 cyl.)
Benz
Bergdoll
Berliet
Black Crow
Buick
C. G. V.
Cadillac (4 cyl.)
Cartercar
Cleveland
Coates-Goshen
Crawford
Daimler
Delahaye
Dorris
Dragon
E. M. F.
Empire
Enger
Everett
Fairbanks
Firestone-Columbus
Franklin
Frontenac

Welch
White
Westinghouse

Marion
McFarland
McIntyre
Mercer
Middleby
Midland
Mitchell
Moline
Moon
Napier
Nora
National
Northern
Oakland
Ohio
Oldsmobile (4 cyl.)
Overland
Palmer-Sign
Panhard
Parry
Patterson
Pennsylvania
Petrel
Pope Toledo
Pullman
Queen
Rainier
Rambler
Rapid
R. C. H.

Use Heavy For:

Bianchi	Darracq
Brazier	DeDietrich
Cadillac (2 cyl.)	DeDion
Chadwick	DeLaunay-Belle-
Clement-Bayard	ville
Fiat	Rochet-Schneider
Frayser-Miller	Lambert
Hewitt	Lancia
Jackson (2 cyl.)	Leon Bollee
Jenkins	Mack
Renault	Nance
Croxtton-Keeton	

Use Light or Medium For:

Alco	Brush
Allen-Kingston	Ford
American Mors	Haynes
Atlas	Hupmobile
Lexington	Stearns-Knight
Marmon	Page-Detroit
Maxwell	

Use Extra Heavy For:

Autocar (2 cyl.)	Chase
Cameron	Corbin (air)

New Selling Branches.—The Standard Woven Fabric Company of Worcester, Mass., manufacturers of "Multibestos" Brake Band Lining, have appointed as new selling agents, Petry-Cassidy, Inc., 1416 Vine street, Philadelphia, Pa., and James G. Barclay, 720 Main street, Buffalo, N. Y. These are in addition to selling branches already established in Boston, New York, Detroit, Chicago, St. Louis and San Francisco.

Mosler Spit Fire Plugs are the BEST 1898-1912

14 Years of Phenomenal Success

A STANDARD WITH LEADING
AUTOMOBILE MANUFACTURERS

Made to Fit Any Engine — Any Thread

For 13 Years have been like this

INSIST UPON
THIS TAG



THIS RED TAG

FASTENED TO THE PLUG INSIDE OF THE BOX
FOR YOUR PROTECTION INSURES

Genuine Platinum Point

WORKMANSHIP AND MATERIAL

Guaranteed Forever

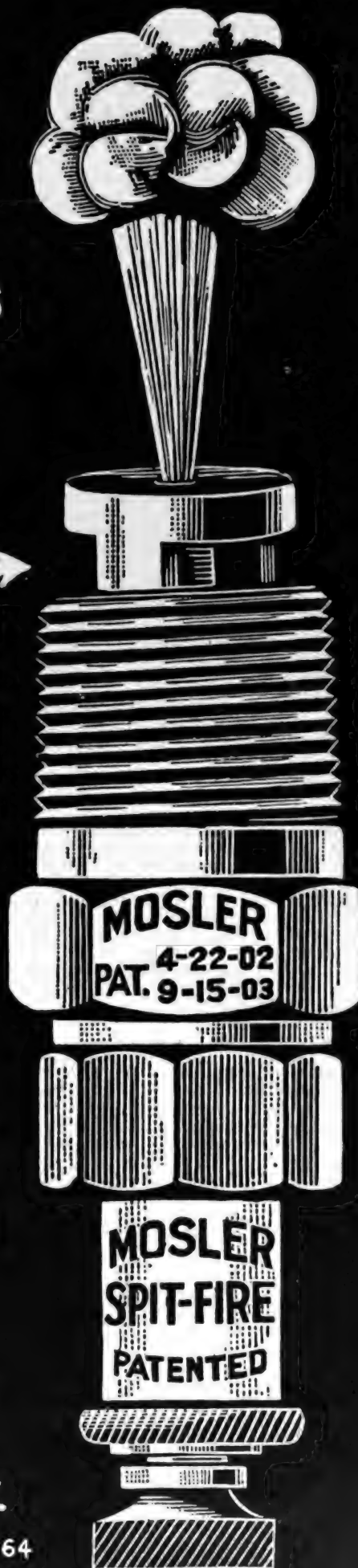
WORK EQUALLY WELL ON BATTERY OR MAGNETO

Insist on the Special Octagonal Brass Cap marked Mosler, N. Y.

BEWARE OF IMITATIONS

A.R. MOSLER & CO., NEW YORK, N.Y.

64



Power Hack-Saw Machines.—A very handy machine for the repair shop is the Improved Hack-Saw Machine for sawing metals, manufactured by L. H. Olmsted's Son, Hasbrouck Heights, N. J. This machine is made in various sizes and is provided with saw guides which insure perfect work and prevent the saws from breaking. The vise for holding the work can be placed at any angle and a pointer is attached, to move along a graduated segment to indicate various angles. The saw has a true horizontal movement in all positions. The list prices of this machine are from \$15 up, according to size and requirements. Our readers should write or send for free circular and price list to the above firm, not forgetting to mention The Automobile Dealer and Repairer.

A New Automobile Headlight.—The latest practical improvement in automobile lighting and apparently a decidedly useful innovation, is the "Butylite" Lamp, which is entirely different in principle than anything of the kind now on the market. Alcohol is used for fuel and the lamp is self-contained, thus doing away with all tanks, pipes or tubing. Behind the reflector of the nine inch lamp is a small receptacle, which is designed to contain about a quart of alcohol, this being sufficient to keep the lamp going for about 20 hours, on one filling.

The method of operating the lamp is simple, safe and effective. Air-pressure is introduced into the alcohol receptacle, by means of the tire pump, until about 25 pounds of pressure is indicated by the gauge, which is provided on the back of the lamp, a Schrader valve being used for holding the air. The air pressure combined with the alcohol generates a vapor and the combustion of this vapor causes an incandescence. A mantle is used which is of special make, protected by patent. This mantle is of double thickness, mounted on an asbestos spool and so shaped that it is practically immune from damage by violent jolts and jars. Its life should be three months or longer. Extra mantles are supplied with the lamps.

The lamp is provided with a powerful parabola reflector, and the 70 candle power light, which is intensely brilliant, yet white and mellow, has a 600 feet throw and a 250 feet spread, with unimpaired intensity and will light both corners when turning. The light also has a regulating device, so that it can be dimmed to the lowest candle-power without flickering. In lighting up, the top valve is turned enough to get a drop or two of alcohol, which is lighted with a match. The door of the lamp is closed, except a slight opening to admit air. The alcohol will burn and heat the vapor coils and as soon as vapor is generated the mantle will burst into incandescence, when the door should be closed and fastened. The process of lighting only takes from 50 to 90 seconds.

Convenience, efficiency and economy are claimed for the new lamp. The fuel being alcohol, preferably "Pyro" denatured, is cheap only about 15 cents a quart, and obtainable everywhere. The estimated cost of operation of each of these lamps is about one cent per hour.

The lamp may be detached and used as a trouble and inspection lamp, wherever needed.

Good agents and dealers are wanted for the "Butylite" lamps throughout the

country, and correspondence is invited from all. Address your inquiries to "Butylite," Dept. A, 32 Union Square East, New York City, and mention this magazine.

Matchless Auto Lighting System.—In this issue the Advance Motor Specialties Company, 509 S. Dearborn street, Chicago, Ill., have an announcement of their Matchless Auto Lighting System. There are no coils, no batteries, no short circuits and no gas waste. No expert is needed to install it. Write at once to the company as above for descriptive circular and further particulars and mention this magazine.

Q. D. Rim Remover.—This device is manufactured by Wm. L. Tobey, 12 Lewis street, East Boston, Mass., and will be found illustrated and briefly described in our advertising department. If your dealer does not have it, Mr. Tobey will send you one for 65 cents. It is a little device which every motorist should add to his kit of tools.

Five Minute Cure Vulcanizing Cement.—This cement is made by the American Tire & Rubber Company, Akron, Ohio. It can be used on inner tubes, blow-outs and punctures, and is said to make permanent repairs in five minutes. Write to the company as above for prices and further particulars, mentioning The Automobile Dealer and Repairer.

"Oxydonor."—Many people will wonder what the word "Oxydonor" means. An intelligent description cannot be given in a few words, so we advise our readers to write for some free books giving further particulars to Dr. H. Sanche & Co., Inc., 489 Fifth avenue, New York City. Consult the advertisement of this company on another page. "Oxydonor" is not so much a device as a means for securing health. It is not a medicine. It is said to be a nature's way for destroying disease of every character, promptly, painlessly and inexpensively. It is no new thing. It has been on the market a number of years.

"Mobo" Auto Cleanser.—"Mobo" is a soap and vegetable oil compound. It is made of the best linseed oil, which is the principal ingredient in paint and varnish. If you use "Mobo" to clean your car, you can have it cleaned as often as you desire and it will look brighter every time. This preparation is sold in small and large cans and in half barrels and barrels by auto supply dealers. It is made by John T. Stanley, 644 West 30th street, New York. It is easily applied, plain water and a sponge and a little action is all that is needed. It will take off the grease and dirt and make the car look like new, we are told, and will preserve instead of diminish the lustre. If your dealer does not keep "Mobo," write direct to the manufacturer. In writing do not fail to mention this magazine.

The Star Speedometer.—These speedometers embody all the improvements which the manufacturers have been able to think of in the last five years, and the workmanship is of the best. They are said to be very complete and reliable instruments for indicating the speed of automobiles and motor vehicles of all kinds. If you have an "Odometer" as well as a Star Speedometer you can keep yourself posted at all times as to the speed and the distance traveled. These devices are said to be as reliable as the Corliss engine and are instru-

ments of beauty as well as usefulness. The confidence of the manufacturers in this device is shown by the fact that they are willing to send it out on trial for 30 days. They could not afford to do this with an inferior instrument. They claim that the "Star" is the equal of any instrument costing from two to four times as much. But write for their 40 page catalogue and mention this paper, keeping it in mind that it will cost you nothing to test the "Star."

The United States Compass Company of Cedarburg, Wis., manufactures the Kraemer Releaser and Retainer with adjustable jaw. It is said, with this tool and the description that goes with each one, any one can grind valves. But consult the advertisement of this company and either send your order to the above address or write for circular giving further particulars.

Peck's Air Inspirator.—This device, which will be found further described in our advertising department, is a gasoline saver and power and speed increaser, the manufacturers tell us. It admits air into the intake pipe above the carburetor works. It is claimed that it will pay for itself in a very short time in the saving of gasoline alone, besides giving a cooler and smoother running motor. For further particulars, write to the manufacturer, E. C. Peck, 432 Third street, San Bernardino, Cal.

The Rie Nie Manufacturing Company, 421 Washington avenue (North), Minneapolis, Minn., manufactures a Hard Rubber Air Drying Black Enamel for brass lamps, radiators and brass fixtures in general. Garage men, it is said, can use this product, applying it in the open air and getting precisely the same result as is obtained from a baked enamel. It dries in from six to ten hours to a bone hardness, leaving a beautiful black finish produced either in gloss black or semi-gloss black. There are a great many motorists who are anxious to have their lamps, etc., black enameled provided they can have it done without being greatly inconvenienced. This preparation opens to the garage man a new field of usefulness. The Rie Nie Mohair Top Water Proofing, it is said, will refinish absolutely water proof automobile tops without stiffening the material and make the tops look equally as good as new. It dries in from five to six hours leaving a silk mohair effect. Anybody can apply it. This company also makes an enamel dressing which will refinish leather tops as well as cushions. They have for sale another product called the German Radiator Compound. It will repair any leak in the radiator or water jacket, without clogging the circulating system, as it only requires a tablespoonful to make the repair and the job will be equally as good as new, and in some cases it is said it will be better than if it were soldered. Each product of this company is absolutely guaranteed.

"Nine Profits and a Host of Truly Wise Ones."—This is the title of a booklet recently brought out by the B. F. Goodrich Company of Akron, Ohio, containing information of value to every motorist with respect to tires manufactured by this company. The tire experience of 35,600 car owners is summarized in this booklet. But consult the full page announcement of this company on another page, headed "A Mountain of Evidence."

\$1,000 CASH REWARD



SEND 5 CENTS IN STAMPS FOR PICTURE IN COLORS

THE BRICTSON MFG. CO. Have set aside \$1,000.00 in cash, which they offer to pay to any person or persons that can run more miles on a set of Pneumatic rubber tires **WITHOUT** Brictson Detachable Treads applied than **WITH**. This offer is open to the **MOTURING PUBLIC** including the **MANUFACTURERS** of RUBBER TIRES. Remember, this is a **CASH** "proposition"—none of your **CHEAP** "trophies," with an inflated valuation.

THIS IS A REAL BLUFF—WHO WILL CALL IT?

Now, Mr. "Free Adviser," You who are always so vitally interested in advising some fellow motorist against using Treads, whispering confidentially in his ear that he must not use them as they will ruin his tires, cause blowouts, heat the tubes and cause them to break—and all such foolish and untrue talk that has been "trumped" up by some one interested in keeping down the sale of tire protectors, something that is a **REAL NECESSITY**—that **ALL MOTORISTS SHOULD HAVE**—here is a chance to prove your statements. We stand ready and willing to prove ours. Now, if you **KNOW** so much about the "TIRE GAME" get busy at once, for according to **YOUR** advice, the \$1,000.00 will be "**EASY MONEY**."

CONDITIONS OF THE CONTEST

THE BRICTSON MFG. CO. Will use the same 66-H. P. six cylinder, seven passenger Pierce-Arrow car herein above illustrated, weighing 6,500 pounds, fully equipped with "**BRICTSON**" **DETACHABLE TREADS**, that won the tire test last July in the "**TWIN CITY TO HELENA AUTO TOUR**," and which was also **OFFICIAL PRESS CAR AND STARTER** in 1911 **BIG GLIDDEN TOUR**—New York City to Jacksonville, Florida.

THE CONTESTING CAR shall be one of same size and weight, using exactly the same size tires and tubes, and the tires and tubes on both cars must be exactly alike, so that one contestant will not have unfair advantage of the other.

The same schedule of **TWENTY MILES PER HOUR** shall be maintained—the same as in all **A. A. A.** tours for this class of cars. Each party shall have the privilege of furnishing an observer, who shall be a passenger in the contesting car. The run shall start from Brookings, S. D., and extend West to Los Angeles, California, and return.

TO LIVE DEALERS.

Do you realize that "**BRICTSON**" **DETACHABLE TREADS** are the best tire protectors on the market and that 1912 Models are even superior to the 1911 treads that made such a sensation in **THE TWIN CITY TO HELENA TOUR**, also the **Big Glidden Tour** (New York City to Jacksonville, Florida)?

Isn't it about time you were getting in line to reap your share of the profits from their sale in your territory? Some one will if you don't.

It is getting to a point now where Brictson Agencies are at a premium. Why not beat the other fellow to it and stick to it after you do get it, for the longer you have the **BRICTSON AGENCY** the greater asset it becomes. Send the coupon in the lower left hand corner of this page and we will do the rest.

THE BRICTSON MFG. CO.,
142 Brictson Building,
Brookings, South Dakota.

Without obligation on my part, send me your dealer's price list and full particulars.

Name.....
Address.....

THE BRICTSON MFG. CO.
BROOKINGS, S. D.,
U. S. A.

THE BRICTSON MFG. CO.,
142 Brictson Bldg.,
Brookings, South Dakota.

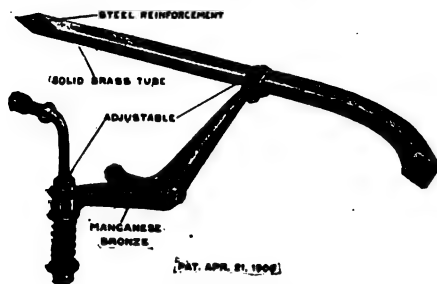
I am interested and would like to know more about "**BRICTSON**" **DETACHABLE TREADS**. Send me your booklet, "**The Enemy of Tire Expense**," proofs from Automobile owners, Prices, etc.

Size of Tire.....
Name.....
Address.....

Please mention the Automobile Dealer and Repairer when writing to advertisers.

Sager Shock Absorbers.

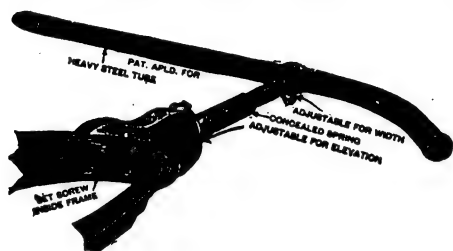
The J. H. Sager Company, Rochester, N. Y., make equalizing springs and protection bumpers which add much not only to the comfort of the occupants of automobiles but they afford a decided protection to the car. They are exceptionally high grade and are



Sager Diamond Bumper.

generally used on high price cars, as they will always retain their original rich appearance. To meet the demand of clamped-on-bumpers, they have designed the Rochester and Simplex Bumpers which are of the clamped-on-variety without clamps. The Rochester Bumper is nearly universal in its attachment, fitting accurately over 100 different cars.

Sager Equalizing Springs need but little introduction as the firm has manufactured them without change for the



Sager Rochester Bumper.

past eight years and have over 100,000 in use. These springs gently check the down thrust and recoil over rough roads without destroying the resiliency of the flat springs over ordinary smooth roads. Unlike any other type of shock absorber, there is absolutely nothing to wear, adjust, oil or get out of order.

A Free Catalogue de Luxe.—If you have the remotest interest in automobiles, you surely ought to send for the beautiful Catalogue de Luxe for 1912 which has just been issued by the Maxwell Division of the United States Motor Company. The record recently made by the Maxwell cars is so remarkable that it has attracted world wide attention. The Maxwell team of three touring cars won the last Glidden Tour and was the only team to travel over 1454 miles of America's worst roads from New York to Jacksonville, Fla., with an absolutely perfect score. The victory was decisive and unprecedented and carried with it the justly earned title of "America's Touring Champion." The triumph was more remarkable owing to the fact that every American car of importance was represented, some of the cars costing as high as \$6,000, while the Maxwell cars, which won, only cost from \$600 to \$1,480. The pictorial cover of the Maxwell catalogue is a triumph of art and the whole catalogue is one of the finest ever produced in the automobile trade. Before you forget about it send a postal card for this catalogue. In

writing be sure and address your card to the Maxwell Division of the United States Motor Company, 6 West 61st street, New York City, and mention this magazine.

Atlas Appeals From Lower Court Decision.—On March 21st the Atlas Chain Company of Brooklyn, N. Y., filed an answer which carries their case to the Court of Appeals for the second circuit, which embraces New York. This appeal is from a lower court decision with reference to the Parsons Patent, in which it was held that even though the Atlas Chain was a snug fitting chain when on the wheel, it crept slowly thereby becoming an infringement. The Atlas Chain Company claim that notwithstanding that the Court of Appeals at Chicago, in January, 1911, held the Parsons Patent to be absolutely invalid for want of equity and at a subsequent re-hearing a differently constituted Court of Appeals in the same circuit held the Parsons Patent to be valid to a limited extent, Atlas Chains do not come within the concept of this last decision as construed by the Court of Appeals in Chicago. In proof of their contention the Atlas Company refer to decisions by Judge Amidon of Boston and Judge Angell of Detroit who have held (Judge Angell as recently as January, 1912) that a snug fitting chain is not an infringement of the Parsons Patent.

Good Agents Wanted.—Agents in various parts of the country are wanted to handle the Hawthorne Four Cylinder Hand Air Pump, which is manufactured by the Hawthorne Manufacturing Company, Inc., 1 Spruce street, Bridgeport, Conn. No motorist is now satisfied unless his car is equipped with some sort of a tire pump and we understand that the Hawthorne device is one of the best on the market and special inducements are offered to agents and dealers to make this pump a paying proposition for them to handle. In writing mention The Automobile Dealer and Repairer.

A Valve Spring Remover.

The United States Compass Company, Cedarburg, Wis., have invented a new tool called The Kraemer valve spring releaser and retainer, which they

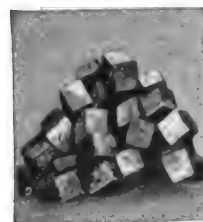
THE KRAEMER RELEASER & RETAINER
WITH ADJUSTABLE JAW

have a United States patent on. The illustration shows the tool which has one adjustable jaw which can be set in a few seconds to fit any sized motor, large or small. This is a simple, practical tool for releasing, retaining, and removing engine valve springs. Anyone can operate it easily. It does the work on any make of automobile. When the spring has been released both hands of the operator are free to remove the valve and spring which is retained ready to be replaced, or can be removed. Automobile users know the necessity of having the engine valves ground to a perfect seat to get the most efficiency from their motor. With this

tool frequent inspections of the valves are easily and quickly made. The firm furnish gratis with each Kraemer valve spring releaser and retainer, simple practical instructions for grinding your engine valves. For particulars see the advertisement on another page. In writing mention The Automobile Dealer and Repairer.

Metalite Carbon Remover.

This is a new invention for removing the carbon from automobile engine cylinders. Metalite is a soft, combustible metallic compound, in the form of small cubes. The cut shows a heap of these cubes, exact size. These cubes are placed in the cylinder, and the Metalite being very heavy, the rapid action of the motor enables it to actually heat the carbon off, and the loosened carbon is blown out through the exhaust valve, with the explosion of the



Metalite Carbon Remover. Cubes are exact size.

burned gases. The cubes being combustible, ignite and are consumed shortly after they beat the carbon loose, and pass out through the exhaust valve in the form of a gas. The Metalite cubes are guaranteed not to damage the motor in any way. As they are softer than the cast iron, from which the cylinders and pistons are made they cannot possibly scratch or damage the motor in any degree or particular. Metalite is guaranteed not to contain any acid, grit or any substance that could possibly mar or damage the polished surfaces inside the motor. It is impossible to give full particulars concerning this remarkable invention in this article and readers are urged to write for further details to the Marshall Oil Company, Marshalltown, Iowa, who are the sole distributors of Metalite. In writing

them please mention The Automobile Dealer and Repairer.

Whiz Metal Polish.—This preparation it is said by the manufacturers the R. M. Hollingshead Company, P. O. Box 3344, Camden, N. J., will produce a brilliant and long wearing lustre quick and easy. This company has so much confidence in the Whiz polish that they would like to send a sample free to every reader of this paper. In writing for it, kindly mention The Automobile Dealer and Repairer.

Subscribe to the "Automobile Dealer and Repairer," \$1.00 Per Year.

The Atwater Kent Ignition System

Prepare Now for Summer

BETWEEN now and Spring, thousands of Atwater Kent Systems will be installed on new and old cars of nearly every make and model. Every dealer, garage and repair man, as well as every car owner, should keep in touch with us during this overhauling season.

Many cars need only a reliable and efficient ignition system to make them run better than new—and now is the proper time to make the change.

The Atwater Kent System gives better results than the best magneto at less than half the cost. There is practically no wear, and its simple adjustment seldom requires attention. It is easy to install.

In the entire system, there are but three moving parts and one contact—no commutator, relay, or vibrating coils are used. A set of ordinary dry cells will run your car 2000 to 3000 miles. No more simple or efficient ignition device is known.

Write now for new illustrated booklet "G" with interesting details and full description.

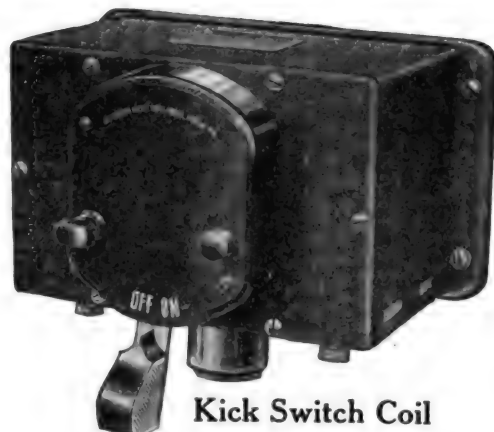
Atwater Kent Mfg. Works

42-50 N. SIXTH STREET

PHILADELPHIA, PA.

New York.....E. J. Edmond Co.
Boston.....F. R. Parker Spec. Co.
Chicago.....Motor Car Supply Co.
San Francisco.....Chanlor & Lyon M. S.
Co., Weinstock-Nichols Co.

Milwaukee.....Julius Andrae & Sons
Omaha.....Omaha Rubber Co.
Chattanooga.....Sanford Bros.
Dallas.....Fisk Co. of Texas



Kick Switch Coil

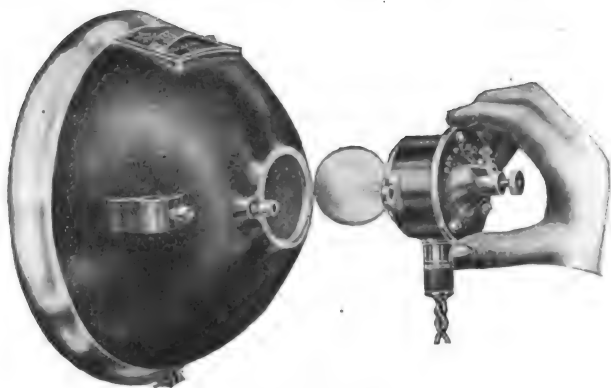


Special Outfit
for 2 cyl.
Buick Cars

Also Special Outfits for Fords
Maxwells and Franklin Cars

A New Headlight.

The Milwaukee Bronze Casting Company, of Milwaukee, Wis., are manufacturers of the Electric "Star" auto headlights. They are placing a new automobile headlight on the market which is convenient to any motorist who uses electricity for his car equipment. It is made of aluminum, and the interior is ground to a very high polish, mirror-like. The manufacturer claims that the reflector will not tarnish as readily as silvered reflectors. The convenience of these headlights are the method of quick changing the bulbs.



The Star Headlight.

You are able to change a bulb in about 15 seconds. You do not have to open up doors or remove the front glass in order to change bulb. The city motorist, with a pair of "Star" headlights can use for city driving very small candle power bulbs, which is economical on his battery and when he takes a country spin he can change bulbs quickly, and have a service of high candle power. These conveniences are important, especially at night when you happen to have any trouble with your engine, you can use the rear hub of the lamp for a trouble-finder. For full particulars address Milwaukee Bronze Castings Company, Milwaukee, Wis.

Carbon Troubles.—The Flash Manufacturing Company, 21 Main street, Zanesville, Ohio, make the following instructive and interesting observations concerning carbon and its removal from the engine cylinders: This one trouble is agitating the minds and giving the owners of motor cars annoyance and causing more motors to be dismantled for the purpose of removing carbon deposits, than any other single trouble. The combustion chamber must be kept free from soot and carbon formed by use of poor grade of lubricating oil, too rich a fuel mixture, or by fluctuations of load and speed, causing excessive variations, which means a deposit of unburned, unconsumed carbon. The best rule is to study and know your machine. There are no two engines exactly alike. There is probably nothing of more importance than proper lubrication.

The presence of carbon is announced by: pre-ignition and pounding; loss of power; overheating of engine; inability to throttle engine down to slow speed; backfiring in intake pipe; increased back pressure and clogged muffler. In the absence of one or more of these signs the difficulty is likely other than carbon troubles.

At the first sign, and while the engine and connecting walls are still at the higher temperature, treat the cylinders with carbon remover, or cylinder

compound, for the purpose of decarbonizing the motor. It has been found that the so-called carbon formation in motor cylinders is a combination of carbon and silicon. The silicon comes in through the carburetor and represents quite a large proportion of the whole crust. Carbon, which is the main element of the crust which forms, may be removed if it is combined with oxygen to form a gas. This may be accomplished by introducing some oxygen compound into the cylinders, which will, in the presence of the heat of combustion, disintegrate, and in the pro-

cess of separating into its elements, free the oxygen and induce formation of a vapor or gas, utilizing the carbon of the crust in the new organization.

Tests made by introducing dry cleaning cylinder compound into the cylinders, through the spark plug openings, show that in the presence of the heat of combustion the soot and carbon disintegrate and lose their heat retaining properties. It does not attack the walls of the cylinders but completely vaporizes, leaving no residuum.

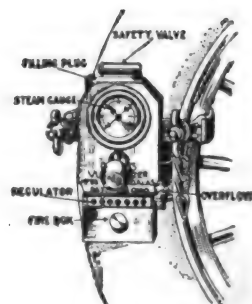
Automobile, marine and motorcycle engines cleaned with dry cleaning cylinder compound will not afterward accumulate carbon deposits so readily as when kerosene or other liquid preparations are used, for the reason that the glaze on the sweep walls is not attacked; therefore the pistons are less liable to pump oil into the combustion chamber.

Big Advertising Campaign for Famous Product.—One of the largest advertising campaigns recently attempted in the automobile trade is now being inaugurated by the Vacuum Oil Company of Rochester, N. Y. They are using double page announcements in the Saturday Evening Post, Collier's, Literary Digest, Scientific American, Life, and other celebrated publications of large circulation. Of course the sale of a product so largely advertised is certain to increase and we would advise dealers to stock promptly with the various grades of "Mobiloil." We also wish to call special attention to the double page announcement of this company which appears in the present issue. This announcement contains exceedingly interesting information on lubrication and it should be read by every car owner or dealer who subscribes for this journal. The announcement also contains a schedule showing the proper grade of "Mobiloil" to be used on every known make of automobile. Address all correspondence to the main office of the Vacuum Oil Company, Rochester, N. Y., and mention this paper.

Air Compressors.—The Gardner air cooled compressor is maintaining a high reputation for garage work. With it air can be pumped directly into the tires without the necessity of an air receiver or without the least danger of any oil being carried over into the pipes. The almost universal use of pneumatic tires has created the demand in garages of this country for means of providing in an economical manner a sufficient supply of fresh air so that tires can be pumped up quickly and properly. This is a great convenience to the car owner and garage men will find that car owners will appreciate it. This compressor requires little floor space and is guaranteed for 150 pounds of working pressure. The time of filling the tire depends of course something upon its size and the size and capacity of the compressor, but it is done in a minute or two. This firm not only makes these air compressors, but water cooled compressors and electrical outfits. Full particulars with prices can be secured by addressing the Gardner Governor Company, Quincy, Ill.

The Dallas Steam Vulcanizer.

The accompanying illustration is of a portable steam vulcanizer, which is being placed on the market by The Montgomery Machine Company of Dayton, Ohio. This vulcanizer is light and can be carried handily only weighing a few pounds. It is simple, easily operated and a substantial device which can be practically applied at any place on the road or at home. This vulcanizer has been thoroughly tested and has been sold for over a year to resident automobile owners of Dayton, Ohio, where it is manufactured and has



The Dallas Steam Vulcanizer. Manufactured by Montgomery Machine Co., Dayton, Ohio.

proven satisfactory in nearly every instance. The manufacturers are placing this vulcanizer on the market at \$12.00 each and more full and complete particulars with illustrated catalogue will be supplied by them by writing and mentioning this magazine. Address the Montgomery Machine Company, Canal street, Dayton, Ohio.

Removal.—J. Stewart Smith, who is favorably known to the trade in New York City and elsewhere, as a successful dealer in auto supplies, has removed his offices from 1779 Broadway, New York City, to much larger quarters at 250 West 54th street. Mr. Smith has recently been appointed sales manager of the Wohlfeld Trunk & Bag Co. of Philadelphia. He also represents the Briggs Magneto Company of Elkhart, Ind., Cleveland Speed Indicator Company, Cleveland, O., Auto Specialties Company of Chicago, Ill., and Morsey Manufacturing Company of Cleveland.

HARRIS

TRADE MARK-REG. U.S. PAT. OFF.

OILS

Actually Save You Money

THE SAVING is in the increased mileage they give. There is more lubrication in every drop of HARRIS OILS than there is in ordinary lubricants.

THE SAVING is in the reduced cost for upkeep. Remember that the soot-deposit ingredients are eliminated to the greatest possible extent. This naturally reduces chances of carbonization. There is less cost for repairs and overhauling.

THE SAVING is in absence of lubricating troubles. Your engine runs smoother—no knocking or pounding, no constant grinding of valves.

It costs but little—a trifle, to prove the efficiency of HARRIS OILS. One or two cans tell the story more graphically than thousands of advertisements.

If you too, believe HARRIS OILS will save you money and give you a better motor—why not try them?



If your dealer does not sell Harris Oils, send 80 cents (for 1 gallon can) or \$3.75 (for 5 gallon can) and we will ship same prepaid.

A. W. HARRIS OIL COMPANY

326 South Water St., PROVIDENCE, R. I.

143 No. Wabash Ave., CHICAGO, ILL.

FORD OWNERS

MAGNETO LIGHTING OUTFIT

is intended to change the present searchlights on the Ford car from gas to electricity, and is complete in every detail. The current is taken from the magneto and positively will not interfere with the running of the car in any way.

Reflectors are 9" in diameter fitted with Bayonet bases, and they fit against the glass of the lamp, making it impossible for dust and moisture to get at the silverplated surface of the reflectors. Bulbs are 6 v., 6 c.p., 2 1/16" in diameter and outfit is furnished complete with wire, switch, connectors and everything necessary to equip your car with electric lights that are the equal of any now on the market. This outfit is guaranteed to give satisfaction, and if for any reason you are dissatisfied you may return it, and your money will be refunded.



PRICE \$8.00 PREPAID



OIL GAUGE FOR MODEL "T" FORDS



Take the place of the lower pet-cock on the Model T Ford and tells you at a glance just how much oil you have. Eliminates smoke, carbon, pitted valves, etc., all caused by excess oil. Can be put on your car in ten minutes and will last a lifetime. Saves its cost in oil the first month. 50,000 now in use. As necessary to the car as hands to the clock.

PRICE \$1.00 PREPAID

Twenty other Specialties for Ford Cars, carried in stock by most Ford Dealers. :: Free Catalog

AUTO PARTS CO.

Ford Dept.

Providence, R. I.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

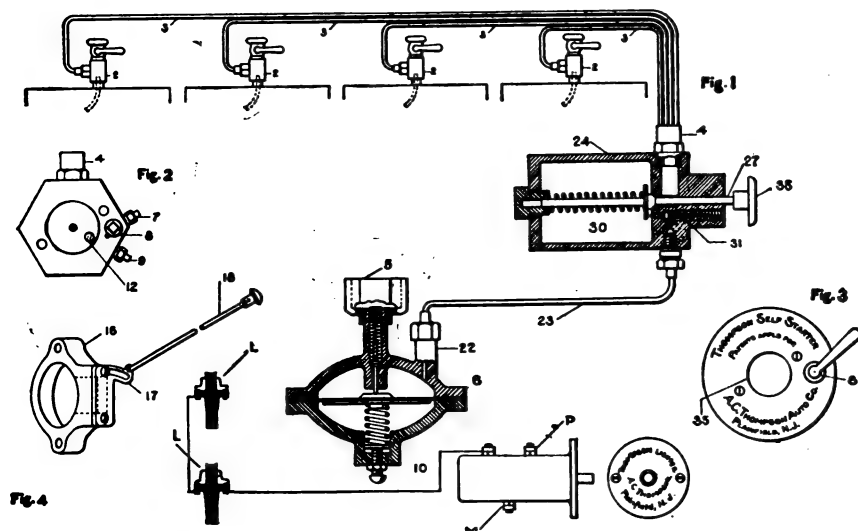
A New Self-Starter.

The Andrew C. Thompson Company, 413 Park avenue, Plainfield, N. J., has invented a self-starter and self-lighter which has thus far been put on about 50 cars of different makes locally, and the firm has had an excellent chance to watch their performance in the hands of car owners, and they say that they have not had a single complaint. It has a number of important new features. For instance, note the convenience of operation: Simply push or kick the push button, turn on your head lights at the dash board (and when they furnish their self-lighting attachment) simply push a small push button inserted in Fig. 3, No. 14 to light your head lights. You will note that no matter how this

past year—a growth that has been little short of phenomenal. For many years, Gray & Davis have been building lamps for all classes of cars. They have been known as aggressive and up-to-date manufacturers and have been instrumental in placing on the market, every known improvement in the way of automobile lighting systems, from the early oil lamp, to the gas lamp and finally the production of the famous Gray & Davis Lighting Dynamo System. The Gray & Davis Dynamo is built in Boston. It is a new plant and contains the most modern equipment and a corps of electrical experts in charge of the manufacture of the dynamo.

The Gray & Davis lamp and dynamo

THOMPSON SELF STARTER AND SELF LIGHTER



starter is operated, or how long the push button is held open, only a measured amount of gas is allowed to enter the cylinders, as valve No. 31 automatically cuts off the gas line leading from the gas tank, and only the amount of gas contained in the chamber, No. 30, is allowed to enter the cylinders. The pressure regulating valve may be adjusted by means of screw No. 10 for the desired pressure required according to size of engine. This regulating valve also maintains a constant pressure for the head lights.

Fig. 4 shows an air valve intended to be inserted between the carburetor and the intake manifold and operated by means of a small foot push button. Instead of throwing off the switch when stopping the engine, simply open this valve, allowing the motor to stop filled up with only pure air, which is the ideal condition for a gas starter, as without this or a similar valve, it is impossible to start a motor well when it is hot and already contains a mixture of gasoline gas. The air valve overcomes this difficulty entirely, making the conditions in the cylinders the same at all times. For full particulars and prices address as above.

Gray & Davis Incorporate.—Announcement has just been made that Gray & Davis of Boston, manufacturers of automobile lamps and dynamos, have just been incorporated under the laws of Massachusetts, capital stock \$1,200,000. This incorporation of the Pioneer lamp builders of America, was made necessary by the enormous growth of their business during the

business has actually outgrown the present manufacturing facilities and this fact, as much as anything else, has forced Gray & Davis to enlarge their production and equipment in every possible way. This announcement should prove of more than ordinary interest to the purchasers of Gray & Davis products and the trade generally.

The Universal Top Cable Reel.—Everybody who has used leather straps for automobile tops understands how they flap against the mud guards, get full of dirt and grease and are seldom adjusted to the proper tension. The Universal Cable reels overcome all these objections. They roll up in a small neat case and are entirely out of the way when the top is lowered. These cable reels are manufactured by Conover & Robinson, 250 West 54th street, New York City, and they retail at \$5 per pair. The cables are made of the finest phosphor-bronze and will not kink. If your dealer does not keep them, write direct to the manufacturers as above.

Flash Decarbonizer.—Our readers should turn to the full page announcement in this issue of the Flash Manufacturing Company, 21 Main street, Zanesville, O. The Flash Decarbonizer is used for removing carbon from cylinders, valves, piston rings and spark plugs without dismantling the motor or laying up the car. The process is said to be a very simple one and the company guarantees the results, but look over the advertisement, cut out the coupon in the corner and send them an order, or if you prefer, write first

for samples with literature giving full details. This company desires agents in all parts of the world for the sale of this preparation, which is a dry powder. When brought into contact with heat, this powder explodes the carbon in minute particles as fine as dust, and ejects it through the exhaust leaving everything clean.

Atlas Auto Pumps.—The manufacturers state that it is an easy job to inflate tires with an Atlas Pump, because it is so powerful. With this pump there is no wasted effort, no back-breaking work—nothing to do but to give the plunger a few strokes, and the tire is inflated. This pump is made of the finest seamless brass tubing. It is an open top, compound pump, has no complicated parts and no intricate mechanism to get out of order. An accurate pressure gauge is furnished with the "Atlas" if you want it. This gauge is guaranteed to register air pressure within 2 per cent. The Atlas Pump is made by the Bridgeport Brass Company, P. O. Station D., Bridgeport, Conn. If your dealer does not keep this pump, it will be sent to you prepaid on receipt of price, which is \$4.00 without gauge and \$6.00 with gauge. In all correspondence mention The Automobile Dealer and Repairer.

Bright Head Lights.—The Draver Manufacturing Company of Richmond, Ind., have an announcement in this issue describing its Cleanout Pump connection which they say will fit any pump. A little air it is claimed pumped through the gas outlets of the generator and through the tubing and burners occasionally will prevent them from becoming clogged. See their announcement in our advertising department.

The K-W Coil Switch.

The new, improved K-W kick switch illustrated here is furnished on all K-W dash coils, and on the K-W Master Vibrator. This is a handsome switch, 4 inches high by 3½ inches wide, with plate or cover, finished in matted brass. The lever cannot be turned unless the



plug in the side is inserted. It is regularly arranged for two sets of batteries or for Low Tension Magneto and one set of batteries, but it can be arranged for High Tension Magneto on one side and batteries and coil on the other side if so ordered, without extra charge. Price, \$2.00. Address the K. W. Ignition Company, Cleveland, O., and mention this journal.

The Northwestern Chemical Company. of Marietta, Ohio, makers of SE-MENT-OL and other automobile specialties, have just purchased the property of the Chapin Pants factory, on Butler street of that city, and are preparing to move into their new quarters at once.

THE "SPARK PLUG" PUMP

Is adaptable for use on all four cycle motors of two, four or six cylinders, and offers at last a simple and practical way to inflate tires using **PURE, FRESH AIR** without the laborious, hard work of doing it by hand.

Simply remove a Spark Plug from any convenient cylinder and substitute the pump (with the hands only) is the advantageous method of attaching to all motors.

The cylinder used doesn't fire, therefore any spark plug can be utilized with either dual or single ignition system. If so desired, a valve cap may be tapped out and fitted with a permanent pet-cock, making it unnecessary to remove a spark plug in using.

The pumps work equally well on all sized cars, from the smallest Ford to the largest Lozier.

After connecting the hose from pump to tire, motor should be started and run on low throttle from two to four minutes, depending on the size of tire—maximum pressure obtainable, 150 pounds.



The pump is noiseless in operation and requires no attention whatever, other than an occasional drop of oil.

This pump is designed on a compound principle, **PURE, FRESH AIR** which is liberally supplied by the intake air valve being compounded to high pressure into the small barrel and thence forced to the tire.

The construction is simple and mechanically perfect throughout with no wearing parts to give trouble or get out of order. **Just like your engine, with metal rings—built to last as long as your car.**

Our Design makes this Pump Absolutely Indestructible. The pumping piston only operates when motor is run on low throttle and automatically locks when the engine is raced; again operating when the throttle is lowered.

An article that is small, light, compact, weighing only two and one-half pounds, which can be carried anywhere—always in working order and ready to use.

Our Selling Plan enables you to try this pump on your own car before purchasing. Furnished with adapters to fit any car and complete with 12 feet of superior hose and connections. **PRICE (Pressure Register \$2.00 extra), \$10.00**

THE MAYO MANUFACTURING CO.
59 E. 18th STREET CHICAGO, ILL.

Say! You Garage Men and Auto Owners

When it comes right down to the fine points as to "what's what" in auto garage equipment, you're the people who know what is best.

Read this letter—every word of it too—recently received from Mr. F. J. Rainier, of Indianapolis, Ind.

He bought a "UNIVERSAL" Auto Turntable but not until he made a thorough examination into the Turntable question.

J. F. RAINIER,
2716 Sutherland Avenue,
Indianapolis, Ind.

February 21st, 1912.

THE CANTON FOUNDRY & MACHINE CO.,
Canton, Ohio.

Gentlemen:

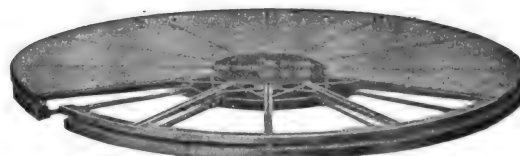
This certifies that I am the owner of a "UNIVERSAL" Auto-Turntable erected in my garage built in connection with my home. Before purchasing I canvassed the Turntable proposition thoroughly. I examined several different tables in operation, many of which would completely exhaust owner in turning car upon them.

I decided upon the "UNIVERSAL" as the best table on the market to-day and most economical, for the best is always the cheapest. My eight year old boy turns car upon the table with perfect ease. Its construction and durability in workmanship makes it a lifetime asset.

The problem of handling the heaviest car has been solved by The Canton Foundry & Machine Company. It gives me pleasure to say that my table is satisfactory in every way.

Yours truly,

(Signed) J. F. RAINIER.



CONCRETE, ANY DEPTH AND GROOVED TO WATER DRAIN

The "UNIVERSAL" solves the problem of handling heavy as well as light cars, because it is properly arranged and constructed.

Catalogue "C-1"

describes and illustrates "UNIVERSAL" Auto Turntables and "UNIVERSAL" Auto Jack and Emergency Trucks, and is yours for the asking.

THE CANTON FOUNDRY & MACHINE CO., Canton, Ohio

Car Economy

DEMANDS THE USE OF

Golden Star

AUTO BODY POLISH

THE WORLD'S BEST

Cleaner and Polisher



It will keep the finish clean, bright and clear, giving it the smooth, velvety freshness that all desire.

Prove the merits of this polish at our expense.

Get a free sample of your dealer or write us.

The best dealers and jobbers sell Golden Star—ask them.

R. W. MORRIS MFG. CO.
(Incorporated)
KANSAS CITY, MO., U. S. A.

"THE CHAIN THAT LASTS"



The "BEST" Traction Chain

What wears out first on your chains?

Let us tell you why ours last longer than others.

H. E. McLAIN & CO., 162 POND ST., NATICK, MASS.

PACIFIC COAST AGENT

JOHN F. REVALK, 405 Golden Gate Avenue, San Francisco, Cal.



Patent Luxury Folding Seats

Made from steel drop forgings; artistic in design and finish; compact, rugged and durable.

A necessity of high grade car equipment.

Write for catalog showing various models.

Hodge & Graves Co.
AMESBURY, MASS.

YOUR COPY of Our Large New 1912 CUT PRICE Catalogue No. 28-N

128 PAGES and over 1000 ILLUSTRATIONS is now ready and will be mailed to you

== **FREE** on request ==

WRITE FOR IT TO-DAY

35% AUTOMOBILE SUPPLY CO.

97 Chambers Street,
NEW YORK.

Uptown Store:
1783-85 Broadway,
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Western Branch:
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CHICAGO, ILL.

One Catalogue—One
Price—One Policy.

Your MONEY'S WORTH or Your Money Back.



Garage Owners

We are manufacturers and dealers in Machine Tools of all kinds and can equip your repair shop with High Grade Machine Tools at a reasonable cost. We also specialize in Reboring and Regrinding Cylinders, furnishing new pistons and rings, etc.

SEND FOR CATALOG.

THE GARVIN MACHINE CO.

141 Varick St., New York City.

DEALERS

¶ We will help you sell AUTOLINE. How? Please write Department No. 2—and write *today*.

Wm. C. Robinson and Son Co.
BALTIMORE, MD.

Please mention the Automobile Dealer and Repairer when writing to advertisers.



SCAIFE

Gasoline Storage Outfits

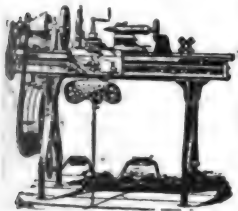
contain no complicated parts to get out of order.

A Welded Tank is the ideal construction for holding gasoline.

Wm. B. Scaife & Sons Co.

Founded 1802.

PITTSBURGH, PA.



THE BARNES LATHES

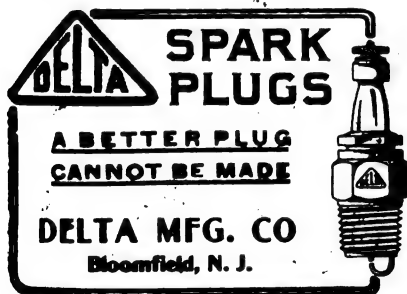
9' swing
11' swing
13' swing

For Repair Work our No. 13 Lathe is right; has 13' swing, auto cross feed, length of beds from 5 to 10 feet long; furnished with counter-shaft or foot-power.

SEND FOR LATHE CATALOG.

W. F. & JOHN BARNES CO.

246 Ruby St., - - - Rockford, Ill.



Plugs are sparking successes. Laugh at the heat. All sizes and styles. \$1.00—Porcelain or Mica. Emil Grossman Co., 250 W. 54th St., New York. Detroit: 844 Woodward Ave.

WE WILL SAVE YOU

An Average of 40 per cent.
On Auto Supplies.

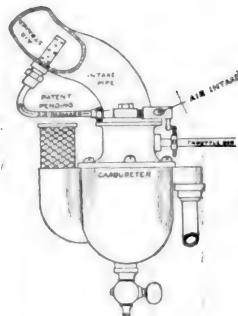
GET OUR FREE CATALOG.

HOLZMAN AUTO SUPPLY CO.

3152 Locust Street, St. Louis, Mo.



Peck's Air Inspirator



is a gasoline saver, power and speed increaser. And why?

Because it admits air into the intake pipe above the carburetor. Works automatically with the throttle. It will pay for itself in a very short while in the saving of gasoline, besides giving a cooler and smoother running motor.

It will run the car slower on closed throttle and faster on open throttle, for the reason that a carburetor adjusted to run good on closed throttle will not run perfect on open throttle.

All that has to be done with the Inspirator is to adjust the carburetor to run perfect on closed throttle, for the reason that when the throttle lever is opened it admits the air through the Inspirator, which gives a perfect mixture and increases the speed of the car with less gasoline.

This device has been tried out on several makes of cars and they are doing four and five miles more on a gallon of gasoline and can do ten and fifteen miles more per hour on speed.

One great advantage we claim for this device over others that are similar, is that the driver of a car does not have to give any of his attention to the mixture of air, as it works automatically with the throttle lever.

A car can be throttled down to four miles per hour in the city and run to its full capacity in the country, without any extra levers to shift.

We guarantee this device to give twenty to thirty per cent more power and speed, or money refunded after thirty days trial.

Price \$5.00 delivered, with full instructions for attaching.

Sold by **E. C. PECK**

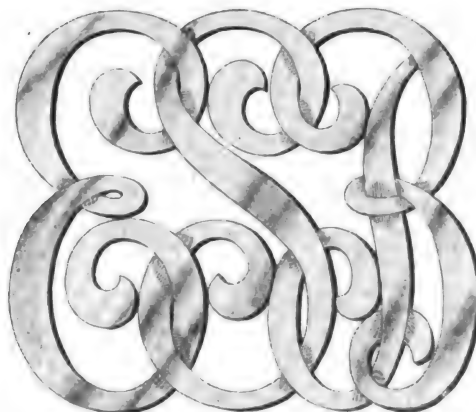
432 Third St., SAN BERNARDINO, CAL.

Auto Monograms and Emblems.

The Hickok Manufacturing Company, Rochester, N. Y., are offering some exceptional values in monograms, physician's crosses, club emblems, etc., for the 1912 season. The monogram is a highly desirable addition to the motor car's equipment. Can you, for instance, if you are the owner of a car which has a thousand or more duplicates, easily pick out yours from a collection of fifteen or twenty of the same model?

Every monogram is designed separately and the drawing destroyed in the making. On account of specializing in this line and the large quantity produced the price of Hickok monograms is extremely reasonable. Write the Hickok Manufacturing Company, Rochester, N. Y., for further particulars, and mention this magazine.

Lobee Pump.—The Lobee Pump and Machinery Company of Buffalo, N. Y.



A Tasteful Auto Monogram. Made by Hickok Mfg. Co., Rochester, N. Y.

The monogram destroys this similarity, and sets your car out from the rest, lending it individuality and distinction. You can readily see that this may not only be an added attraction, but in many cases, a positive protection. The Hickok monograms are especially distinctive, as they are designed by artists skilled in this line.

in their announcement in this issue say if you want circulation on your automobile, or motor boat it can be obtained by using a Lobee Pump. Write for Booklet "A" giving full particulars and mention this magazine.

Subscribe to the "Automobile Dealer and Repairer," \$1.00 Per Year.

The Most Accurate, Reliable and
Desirable Tire Gauge is
The Economy Tire Gauge
Price \$1.00



Manufactured only by
E. EDELMANN & CO.
231 W. Illinois St. - Chicago, Ill.

Look for the Guarantee on the etched name-plate. None genuine without it. Gauge holds the indication until re-set by hand. Comes put up in handsome leather case.

At all dealers or from us by insured mail on receipt of \$1.00. Your money returned if not satisfactory.

DON'T TAKE A SUBSTITUTE.

DEALERS: Write us for Interesting Catalog.

Spring is Here

You who have not already had your cars overhauled should be doing it now. Perhaps you are going to do it yourself? In any event you need now, and will always need, one of our famous "Derby" Auto Screw Plates. Price is right.



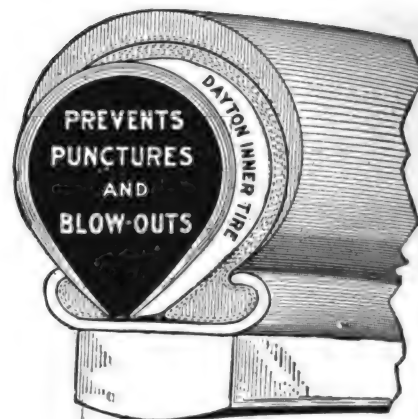
Want Our Catalogue?

BUTTERFIELD & CO.

DERBY LINE, VT. — and — ROCK ISLAND, CAN.

New York Store: 126 Chambers St.

TIRE TROUBLE STOPPED



Wear the tread completely off your tires by using the

Dayton Inner Tires

ABSOLUTELY prevents BLOW-OUTS and 90% of PUNCTURES.

Prevents tube pinches from fabric breaks.

Easily inserted and can be changed from OLD to NEW casings.

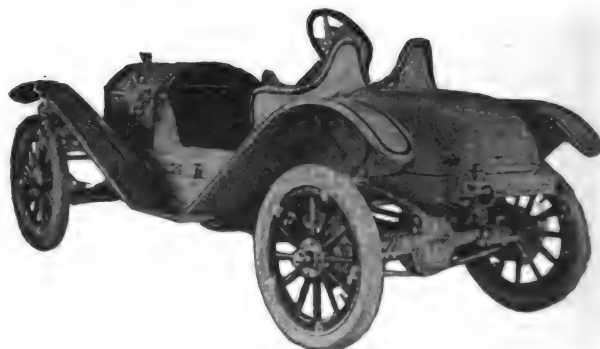
Write (Right now) for Descriptive Catalog.
AGENTS WANTED.

Dayton Inner Tire & Mfg. Co.,

DAYTON, OHIO,

19 Madison.

G. J. G. "Junior"



The G. J. G. "JUNIOR" is a racy-looking runabout that is **GUARANTEED FOR ONE YEAR**

ITS 22-26 H. P. gives you plenty of speed, and a reserve for the worst kind of hills and "bad going."

Its equipment includes a Bosch high tension magneto and Dorian quick-detachable re-mountable rims, with an extra rim for 32x3½ inch tires, gas head lights and generator, oil side and tail lights, and many other excellent features.

The G. J. G. "JUNIOR" is the equal of the average car selling for 25 per cent. more than it does. Compare it with any car selling for \$1,250 to \$1,500. You will find that the G. J. G. "JUNIOR," that costs you only \$1,000 with full equipment, is the superior.

Write us for literature and agency proposition.

G. J. G. MOTOR CAR CO.
WHITE PLAINS NEW YORK

A NEW TIRE FOR \$1.25



By looking over your tires once a week and filling up those curb cuts which are left unprotected so that sand—and water—cannot work through the opening, loosen the tread and rot the fabric—causing blowouts.

Cement Doh prevents all this, and saves the cost of a new tire.

Cement Doh makes all kinds of repairs, such as:

"It's Tough and Elastic" and "Stays Put"

Repairs punctures in tubes.
" casings where the carcass is exposed.
" cuts in casings
" sand pockets.
" blowouts.

For the Cement-Doh Outfit contains one large Blowout Patch, 1 can Doh, 1 can of M. & M. Cement, emery cloth for cleaning, brushes and complete directions.

Repairs will be permanent and you can do it quicker and better than vulcanizing. No heat required—no possible chance of burning your tube or casing.

Ask any Tire Manufacturer if the Cement-Doh process isn't recommended by them.

COMPLETE OUTFIT, \$1.25

Not \$2.00 nor \$2.50.

Sold by all dealers and jobbers or sent direct express prepaid.

THE M. & M. MFG. CO., Akron, Ohio.

Manufacturers of that famous M. & M. Cement—all goods sold on the money back plan.

A POSTAL WILL BRING OUR NEW CATALOGUE.

A Free Book

For Auto Repair Men

This Auto Repairer's Guide & Price Maker is issued in the interest of automobile repairers, dealers, and garage men—it's **free to the trade** and sent to them only.

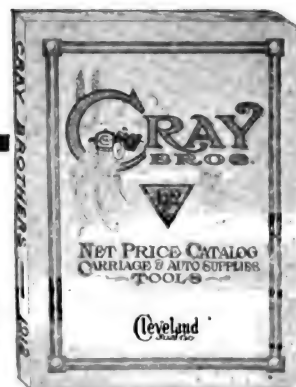
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JOBBER AND MANUFACTURERS OF AUTO ACCESSORIES

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28x3	\$5.00	31x4	\$11.25
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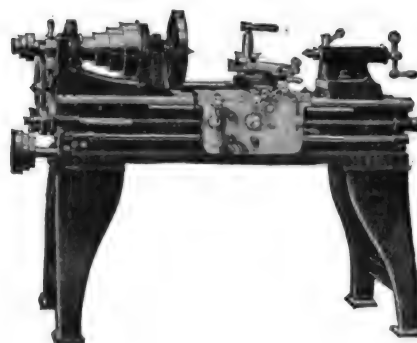
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The LOW-PRICE, PERFECT-QUALITY lathe for the GARAGE and GENERAL REPAIR SHOP.

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The Best
Friction
Facing



For
Brakes
and
Clutches

Made of highest grade of Asbestos woven with copper wire. Acknowledged to be distinctly superior to any similar product.

RAYBESTOS grips and holds. It lines all the best brakes, found on the good cars—enhances the safety and efficiency of every car regardless of make or price. It does not disintegrate upon contact with oil, gasoline, or water. It is the original heat-proof facing and has the highest co-efficient of friction. Comes in all widths. Ask your dealer. Write for our interesting catalog, handsomely illustrated.

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SAFETY

DUPLEX brakes produce maximum safety. They are America's leading brakes. Made by brake experts connected with the industry since its inception.

CONSTRUCTION

The construction and design is such that a larger braking surface is available than in ordinary brakes. Therefore less physical effort is required.

This brake acts instantly—either forward or backward.

How are your brakes? A new set would make your car more efficient and safe. Get a set of DUPLEX brakes. Inexpensive, easily installed, do away with all troubles. Be safe and sure about your brakes above all things. Write to us today. See if we can't help you. We'll be pleased to quote prices and give full particulars.

We manufacture Raymond Brakes and Raybestos Brake Lining and Gyrex.

THE ROYAL EQUIPMENT COMPANY,

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MICHENER'S GASOLINE SAVER

Should interest every motorist.

Economizes Gasoline. Increases Speed. An Excellent Primer.

Breaks up and remixes the gasoline globules with a spray of air.

With this device no carbureter adjustments are necessary, as you can correct the mixture by merely turning a small lever on the dash as you drive along.

Every Autoist knows that when a gasoline engine is first started it requires a richer feed of gasoline than it does after becoming thoroughly warmed up. With this device the air valve is closed when cranking (unless using as a primer) and when the engine warms, the valve is opened giving as lean a mixture as you wish. It is only opened a little on a low throttle, but as the throttle is **opened up** you can give the Gasoline Saver valve its full opening, whether the car is traveling fast on a level stretch or is traveling **slow up a grade**.

For different atmospheric conditions, you regulate the carburetion with the hand control of the Gasoline Saver on the dash while driving along. In the interests of clean plugs, clean cylinders, clean muffler, correct mixture, cool engine and economy of fuel, this hand controlled device fills a long felt want.

When descending grades you can leave the clutch in; close the throttle and open the Gasoline Saver valve full, allowing the engine to act as a brake, thus saving wear on the brake linings; cooling the cylinders and saving gasoline. It is not necessary to turn off the ignition switch as the engine is now drawing in the pure air through the Gasoline Saver.

For priming when the motor is hard to start; the mixer bowl is filled with gasoline and the air valve given the smallest opening. When cranked, the intake stroke sucks the gasoline through the wire gauze cone converting it into a rich perfect spray which ignites instantly. Priming this way does not cut the lubrication of the cylinders as is the case when gasoline is introduced (the old way) through gravity priming cups.

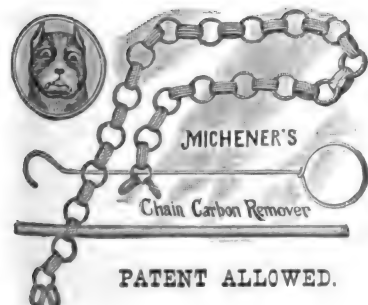
Made of Solid Brass, Polished. Can be installed in a few minutes.

When ordering state side of motor carbureter is on.

PRICE COMPLETE, \$5.00, Including Rod and Dash Connections.

MICHENER'S CHAIN CARBON REMOVER

A safe, scientific and effective device for removing carbon from motor cylinders. Absolutely guaranteed. Made of soft tough wire (90 per cent. copper), a special composition. Will remove all carbon from top, sides and piston head.



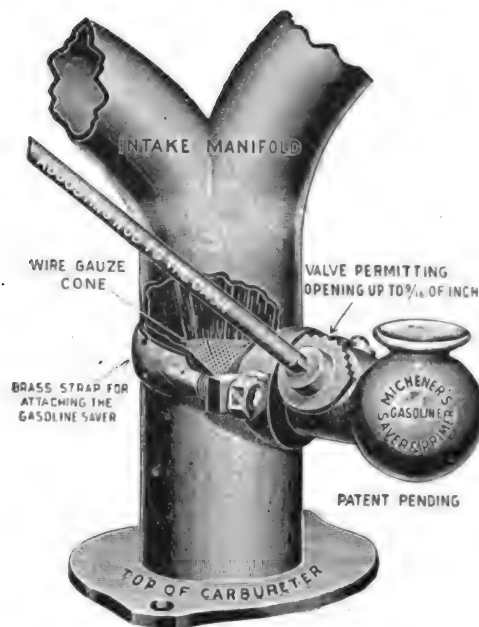
Simple operation; just poke the chain through a spark plug hole, cut off the ignition on this cylinder, then run the motor a couple of minutes with the power of the remaining cylinders.

Now used and recommended by many manufacturers and garages.

Always state kind of motor when ordering.

PRICE 75c., THREE FOR \$2, POSTPAID.

You can clean two cylinders at the same time with two chains.



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Please mention the Automobile Dealer and Repairer when writing to advertisers.

Let us be your Mailing Department

This company has instituted a new Service for Direct Advertising which will handle this part of your advertising better than you can do it yourself, at lower cost than you can do it and with none of the bother.

This New System

does two things. First, it reaches the new automobile owners quick, and second, it reaches the rest of the owners regularly—the two important elements in profitable advertising.

What we do.

For a fixed sum per year, plus postage, we address and mail your advertising matter to every owner of a new car registering in all of the States.

For an additional fixed sum we will address your printed matter once or twice each year to every one of 450,000 automobile owners, or to owners in selected States.

The old way

was to buy lists of registrations and do your own addressing.

But such lists in the larger States now contain not only all new owners but also all owners re-registering year after year.

You can't tell one from the other and two-thirds of your work is wasted because the time a man buys accessories is for the first six months after he gets his car.

And this is the very time when you can reach the new owner only by direct advertising. He does not take any trade paper, as a rule, until later.

Our list of 450,000 names

is all kept on index cards. All registrations are checked against this list and all dead names eliminated. This last item alone makes the ordinary list unprofitable within six months unless so checked.

Our list is depended upon absolutely by the largest concerns in the automobile field as being not only the most complete but the most reliable. It has taken seven years to make it so and we are at it yet. Of this you get the benefit every time we do work for you.

Our charges

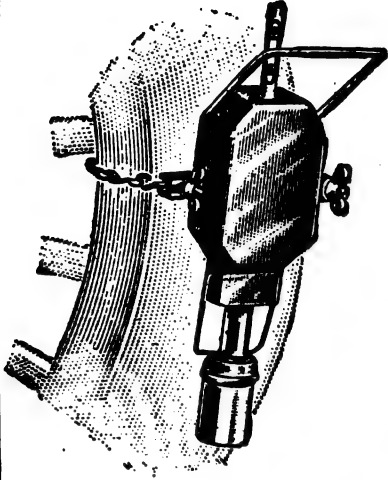
are high enough to enable us to give you the best possible service.

If you will write us we will be glad to give you the details of our Direct Service Plan and of how it may be applied to your work.

Automobile Advertising Company
381 Fourth Avenue
New York City

E-Z-2-Work Steam Vulcanizer—\$9.00

Regular Price, \$15.00



To thoroughly introduce our 'already famous E-Z-2-Work Steam Vulcanizer in every corner of the U S., we will furnish a complete outfit, including all rubber, cement, full instructions and everything ready to start work at our very best agents' price of \$9.00 (regular price \$15.00), to the first man ordering one from each town. Generates its own steam, heated by wood alcohol lamp, repairs both tubes and casings of any size, can be used in country or anywhere, and best of all, it will not burn your tires, as the steam

eliminates all danger. It is "Easy-to-work," and any boy who can read can do perfect work. If it is not satisfactory in every respect, we will refund full amount paid.

JOBBER: Write For Our Proposition.

The E-Z-2-Work Steam Vulcanizer Co.
Cleveland, O.



UNIVERSAL TERMINAL

Fits any type of plug, either foreign or domestic. Turn the threaded fibre sleeve and the jaws are firmly closed and simply cannot work loose.

If the top nut on the plug is lost, the elliptic opening in the brass jaws of the Mac-Kae Universal Terminal will give a secure hold on the thread of the plug electrode.

By fully extending the jaws, this terminal will give secure contact on a plug through the top cap, if by accident the threaded post should be broken off. You can remove the Mac-Kae Universal Terminal while the motor is running.

25c. each at all dealers, or direct from us.

SPARK



PLUGS

(Guaranteed)

Deliver a "fat" spark every time without skip or miss. Give a maximum power with minimum fuel consumption. Do not foul or soot.

All sizes \$1.00, Mica or Porcelain.



MAC-KAE MFG CO Boston, Mass.

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TIRE REPAIR PROCESS

MORE MILES NOTICE

We have changed the name of our old Process to VULCUM so that you may be sure of getting the greatly improved Process.

Now Is The Time

TO LOOK OVER YOUR TIRES
AND
REPAIR THEM WITH VULCUM
IT WILL
SAVE YOUR TIRES
AND GIVE YOU MANY MILES WEAR.
EVERY REPAIR GUARANTEED.
BEST VULCANIZING PROCESS.
HAS ALL ESSENTIALS OF SUCCESS
PRICE COMPLETE OUTFIT \$2.00
Richardson Tire Co.
HARTFORD, CONN.

WE HAVE A SMALLER SIZE

VULCUM OUTFIT

WHICH IS HANDY FOR THE MOTOR CYCLIST,
OR GIVES YOU A FINE CHANCE

**TO TRY THIS WONDERFUL
VULCANIZING PROCESS.**

PRICE COMPLETE, **\$1**
SMALL SIZE,

BE SURE
YOU GET OUR IMPROVED PROCESS
SOLD ONLY UNDER THE NAME

VULCUM

THERE ARE NO SUBSTITUTES
VULCUM IS THE ONLY VULCANIZING PROCESS
THAT HAS ALL 4 NECESSARY STEPS
"SOFTENER," to soften the old rubber and prepare it to properly receive
"REPAIRER" and "VULCUM," and the
"HARDENER," to toughen the finished repair.
**ACCEPT NO TIRE REPAIR OUTFIT UNLESS
IT HAS ALL THE ABOVE STEPS**

We use it and you can, for repairing customers' tires.

EVERY REPAIR GUARANTEED

Complete VULCUM OUTFIT **\$2**
IN STRONG WOOD BOX

THE BEST INVESTMENT YOU EVER MADE.

FOR PROMPT ATTENTION, ADDRESS

VULCUM MANAGER

Richardson Tire Co., Hartford, Conn.

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Index to Advertisers.

Adamson Mfg. Co., vulcanizers...3d cover	Grossman, E. Co., spark plugs..... 85	Splitdorf, C. F., magnetos.....109
Advance Motor Specialties Co., lighting system 94	Guide Motor Lamp Mfg. Co., lamps..... 31	Standard Tire Protector Co., treads.....110
Ahlberg Bearing Co., ball bearings.....111	Gun Metal Finish Co., polish.....106	Standard Woven Fabric Co., brake band lining 2d cover
Alden Sampson Mfg. Co. (Sampson) automobiles.....	G. J. G. Motor Car Co., automobiles..... 86	Stanley, John T., soap.....109
Alden Sampson Mfg. Co. (Sampson) (35) automobiles.....	Hagstrom Bros. Mfg. Co., spark plugs. 22	Star Speedometer Co., speedometers... 19
Allen Auto Specialty Co., tire gauges.....111	Harris, A. W. Oil Co., oil 81	Steam Carriage Boiler Co., boilers..... 95
American Battery Co., storage batteries 97	Hart & Widder Co., pumps.....110	Stoddard-Dayton, automobiles.....
American Bolt & Screw Case Co., revolving cases 22	Haws, Geo. A., Oil 18	Superior Motor Specialty Co., spark plugs 110
American Electric Co., signals.....110	Hawthorne Mfg. Co., pumps..... 95	35 Per Cent. Automobile Supply Co., supplies 84
American Tap & Die Co., screw plates.....114	Haywood Tire & Equipment Co., vulcanizers 24	Times Square Automobile Co., automobiles..... 87
American Tire & Rubber Co., cement.....109	Heath Foundry & Mfg. Co., grinders.....120	Tingley, C. O. & Co., patches.....119
Armiger Chemical Co., polish 20	Hess-Bright Mfg. Co., ball bearings..... 2	Tobey, Wm. L., rim removers..... 29
Arsenal Varnish Co., varnish 104	Hickok Mfg. Co., monograms.....112	Toledo Auto Devices Co., putty.....110
Atlas Auto Supply Co., repair outfits.....102	Hinckley Machine Works, milling attachments 29	Triple-Tread Mfg. Co., treads..... 15
Atlas Chain Co., tire chains.....115	Hodge & Graves Co., automobile seats..... 84	Troy Auto Specialty Co., pumps 106
Atwater Kent Mfg. Works, ignition..... 79	Hollingshead, R. M., Co., supplies.....108	Tuthill Spring Co., springs 27
Auburn Auto Pump Co., pumps..... 30	Holt & Beebe Co., lamps..... 28	20th Century Tire Protector Co., treads 20, 116
Automobile & Accessories Mfg. Co., turntables 24	Holzman Auto Supply Co., supplies..... 85	Underwood, H. B., & Co., cylinders re-bored 13
Automobile Advertising Co., advertising service 90	Horsey Mfg. Co., patches 119	U. S. Compass Co., tools.....109
Automobile Supply Mfg. Co., signals..... 22	Hub Machine Welding & Contracting Co., welding 106	United States Motor Co., automobiles.....
Automobile Tire Co., tires.....120	Hudson Motor Car Co., automobiles.....114	United States Tire Co., tires..... 10
Autoparts Mfg. Co. (Jersey City, N. J.) spark plugs 25	Inner Shoe Tire Co., tire lining..... 7	Universal Tire Protector Co., treads..... 99
Auto Directories Co., mailing lists..... 28	Inst. Lighter Co., ignition.....113	Vacuum Oil Co., oil..... 4, 5
Auto Parts Mfg. Co. (Milwaukee, Wis.) supplies 112	Jeffery-Dewitt Co., spark plugs..... 20	Valentine & Co., varnishes 21
Auto Parts Co. (Providence, R. I.), supplies 81	Johns, H. W. Manville Co., asbestos fabrics and specialties 25	Vanderpool, W., tires 114
Auto-Tire Vulcanizing Co., vulcanizers.....111	Jones, Phineas & Co., wheels.....112	Vanguard Mfg. Co., wind shields.....114
Baldwin Chain & Mfg. Co., chains..... 26	Kellom, Chas. F. & Co., oil..... 30	Voorhees Rubber Mfg. Co., tire lining 2d cover
Barnes Drill Co., lathes 29	Keystone Tire & Rubber Co., tires.....107	Waban Webbing Co., tire lining..... 16
Barnes, W. F., & John Co., lathes 85	Kimball Tire Case Co., treads.....119	Waterbury Welding Co., welding.....108
Benford Mfg. Co., timers and spark plugs 123	K. W. Ignition Co., magnetos and spark coils 118	Western Automobile Supply Co., inner casing 111
Best Ignition Equipment Co., spark plugs 32	K. & W. Mfg. Co., tire lining..... 4th cover	Western Motor Co., motors.....114
Blackburn Specialty Co., locks..... 95	Lansing Co., turntables.....114	Western Robt Mills, buggy washers... 20
Blackledge, John W., Mfg. Co., springs. 28	Leader Mfg. Co., vulcanizers..... 98	Western Welding & Mfg. Co., welding... 29
Blake Spark Plug Co., spark plugs..... 32	Leather Tire Goods Co., treads..... 1	Wheeling Stove & Range Co., vulcanizers 103
Blacksederfer, G. C., Co., spark plugs..... 32	Livingston Radiator & Mfg. Co., radiators 96	Whittaker Chain Tread Co., tire chains. 95
Borbein Auto Co., bodies.....120	Lobe Pump & Machinery Co., pumps..... 95	Wiley & Russell Mfg. Co., screw plates, tools 110
Brennan Motor Mfg. Co., motors..... 30	McIntyre, W. H. Co., automobiles.....114	Williams Foundry & Machine Co., repair outfits 106
Bricston Mfg. Co., treads..... 77	McLain, H. E., & Co., tire chains..... 84	Williams, J. H., & Co., drop forgings... 23
Bridgeport Brass Co., pumps..... 9	MacKae Mfg. Co., terminals..... 91	Williams, Mfg. Co., repair outfits..... 30
Brilliant Gas Lamp Co., gasoline lighting system 27	Mahoney, Dr. W. F., paint..... 30	Winchester Machine Works, tools..... 112
Brooklyn Machine Co., timer brackets..... 28	Marshall Oil Co., oil 122	Woven Steel Hose & Rubber Co., brake band lining 110
Brown Co., pumps 24	Martin, L. G., cement 30	Zacharias, E. H., motors..... 29
Brush Runabout Co., automobiles..... 31	Marvel Carburetor Co., carburetors..... 95	
Buffalo Forge Co., tools 86	Maxwell-Briscoe Motor Co., automobiles..... Front cover	
Butterfield & Co., screw plates..... 114	Mayo Mfg. Co., pumps 83	
Buob & Scheu, auto tops 2d cover	M. & M. Mfg. Co., repair outfits..... 87	
Butylite, lamps 2d cover	Mendenhall, C. S., road maps.....110	
Canton Foundry & Machine Co., turntables and jacks 83	Metal Body Tank & Fender Co., supplies 115	
Cartercar Co., automobiles.....117	Metallic Automobile Matting Co., matting 97	
Catelain, A. G., hose clamps.....110	Meteor-Auto Tank Co., tanks..... 28	
Champion Blower & Forge Co., tools..... 14	Michener, E. S., carbon remover..... 89	
Champion Spark Plug Co., spark plugs 97	Miller, Chas. E., vulcanizers..... 98	
Clarke Carter Automobile Co., automobiles.....108	Milwaukee Bronze Casting Co., lamps..... 97	
C. M. B. Wrench Co., wrenches..... 94	Model Gas Engine Works, motors..... 14	
Colorado Tire & Leather Co., treads..... 3	Modern Automatic Appliance Co., steering device 97	
Columbia Motor Car Co., automobiles.....	Montgomery Machine Co., vulcanizers..... 95	
Comstock, Geo. S., compressors.....114	Moore, J. C., & Co., packs..... 95	
Conover & Robinson, wind shields..... 94	Morris, R. W. Mfg. Co., polish..... 84	
Coulier, automobiles..... 87	Mosler, A. R. & Co., spark plugs..... 75	
Cray Bros., supplies 108	Motor Accessories Makers, Inc., cement.110	
Crone, F. G., pumps 120	Motz Tire & Rubber Co., tires.....119	
Curtis & Co., Mfg. Co., pumps.....120	National Illustrating Co., publication..... 97	
Davies, J. P., Co., soap..... 6	National Motor Supply Co., vulcanizers 73	
Dayton Inner Tire & Mfg. Co., tire lining 86	National Sales Corporation, brake band lining 110	
Dayton Motor Car Co., automobiles..... 85	National Welding & Mfg. Co., welding.....114	
Delta Mfg. Co., spark plugs.....124	New York Coil Co., ignition.....107	
Diamond Rubber Co., tires, tire stock.121	New York & New Jersey Lubricant Co., oil 17	
Double-Fabric Tire Co., tire lining.....112	Northwestern Chemical Co., cement..... 24	
Dover Stamping & Mfg. Co., funnels.....112	Olmedsted, L. H., Son, machines..... 95	
Draver Mfg. Co., cable supports.....109	O'Neill Tire & Rubber Co., vulcanizers.110	
Duryea, Chas. D., & Co., automobiles.....110	Packard Electric Co., ignition cables..... 29	
Edelmann, E., & Co., tire gauges..... 86	Page Lester Co., repair outfits.....120	
Edgar Mfg. Co., signals..... 95	Peck, E. C., air inspirators..... 85	
Empire Tire Co., tires 119	Peerless Accessories Mfrs., pumps..... 26	
Essex Rubber Co., tire lining..... 16	Peerless Cement Co., repair outfits..... 97	
Estherline Co., ignition.....123	Perfect Mfg. Co., vehicle washers 114	
Excelsior Tire Co., tires.....116	Phillips-Laffitte Co., brazing compounds 123	
E-Z-2-Work Steam Vulcanizer Co., vulcanizers 91	Pitner Pump Co., pumps 22	
Felton Sibley & Co., varnishes..... 23	Planhard Mfg. Co., carburetors..... 29	
Firestone Tire & Rubber Co., tire stock.105	Porter, H. K., bolt clippers.....114	
Fisher & Norris, vises 30	Prest-O-Lite Co., tanks, tubes.....100, 101	
Flash Mfg. Co., carbon remover..... 11	Quality Cement Co., cement..... 27	
Fox Typewriter Co., typewriting machines.....113	Queen Mfg. Co., treads..... 13	
Garage Equipment Mfg. Co., supplies..... 28	Racine Auto Tire Co., tires.....97	
Gardner Governor Co., air compressors 97	Randall-Falchney Co., signals 115	
Garvin Machine Co., tools 84	Remy Electric Co., magnetos 8	
Geizer Bros., storage batteries.....114	Rice & Dayton Mfg. Co., vulcanizers..... 28	
Gem City Liquid Vulcanizer Co., repair outfits 26	Richardson Tire Co., repair outfits..... 91	
Gibney, Jas. L. & Bro., vulcanizers.....110	Rie Nle Mfg. Co., radiator compound..... 98	
Gilmer, Jr., G. Walker, pliers..... 25	Robinson, Wm. C., & Sons Co., oil..... 84, 117	
Globe Auto Lock Co., locks..... 23	Royal Equipment Co., brake band lining 88	
Goodrich, B. F. Co., tires 12	Sager, J. H., Co., shock absorber..... 27	
Grant, H. M. fibre 114	Sampson, automobiles..... 2d cover	
Gray Specialty Co., repair outfits..... 16	Sanche, Dr. H., & Co..... 2d cover	
Great American Rubber Co., tires..... 28	Scaife, Wm. B., & Sons Co., gasoline outfits 85	
	Schrader's A. Son, tire gauges..... 32	
	Schug Electric Mfg. Co., storage batteries 110	
	Sebastian Lathe Co., lathes 87	
	Security Co., patches 26	
	Selbach Rubber Co., patches..... 97	
	Seneca Falls Mfg. Co., lathes..... 29	
	Shaler, C. A. Co., vulcanizers.....103	
	Shannon, T. R., polish.....110	
	Spengler Optical Co., timers.....117	

Classified Buyers' Guide.

Advertising Service	Automobile Advertising Co. 90
Air Compressors	Gardner Governor Co. 97
	Williams Foundry & Machine Co. ....106
Air Inspirators	Peck, E. C. 85
Aluminum Cases Repaired	Hub Machine Welding & Contracting Co. ....106
Aluminum Welding Composition	Hub Machine Welding & Contracting Co. ....106
Asbestos Fabrics and Specialties	Johns, H. W., Manville Co. 25
Automobiles	Alden Sampson Mfg. Co. (Sampson 35) 29
	Alden Sampson Mfg. Co. (Sampson)..... 29
	Brush Runabout Co. 117
	Cartercar Co. 117
	Clarke Carter Automobile Co. ....108
	Columbia Motor Car Co. 108
	Coulier 108
	Dayton Motor Car Co. 110
	Duryea C. D., Co. 110
	G. J. G. Motor Car Co. 86
	Hudson Motor Car Co. 114
	Maxwell-Briscoe Motor Co. 114
	McIntyre, W. H. Co. 114
	Times Square Automobile Co. 87
	United States Motor Co. Front Cover
Automobile Seats	Hodge & Graves Co. 84
Ball Bearings	Ahlberg Bearing Co. ....111
	Hess-Bright Mfg. Co. 2
Bodies	Borbein Auto Co. ....120
Boilers	Steam Carriage Boiler Co. 95
	Williams Foundry & Machine Co. ....106
Bolt Clippers	Porter, H. K. ....114
Brake Band Lining	Johns, H. W., Manville Co. 25
	National Sales Corporation .....110
	Royal Equipment Co. 88
	Standard Woven Fabric Co. 2d Cover
	Woven Steel Hose & Rubber Co. ....110

Bracing Compounds Phillips-Lafitte Co. ....123	Matting Metallic Automobile Matting Co. 97	Spark Plugs Autoparts Mfg. Co. (Jersey City, N. J.) 25 Best Ignition Equipment Co. 32 Blake Spark Plug Co. 30 Blickensderfer, G. C. Co. 32 Champion Spark Plug Co. 97 Delta Mfg. Co. 85 Grossman, E., Co. 85 Hagstrom Bros. Mfg. Co. 22 Jeffrey-Dewitt Co. 20 Mac Kae Mfg. Co. 91 Mosler, A. R. & Co. 75 Superior Motor Specialty Co. ....110
Bracing Powders Phillips-Lafitte Co. ....123	Milling Attachments Hinckley Machine Works 29	Speedometers Star Speedometer Co. 19
Buggy Washers Western Robe Mills 20	Monograms Hickok Mfg. Co. ....112	Springs Blackledge, John W., Mfg. Co. 28 Tuthill Spring Co. 27
Bumpers Troy Auto Specialty Co. ....106	Motors Brennan Motor Mfg. Co. 30 Model Gas Engine Works 14 Western Motor Co. ....114 Zacharias, E. H. 29	Steam Packings Johns, H. W. Manville Co. 25
Cable Supports Draver Mfg. Co. ....109	Non-Conducting Coverings Johns, H. W. Manville Co. 25	Steering Devices Modern Automatic Appliance Co. .. 97
Carbon Removers Flash Mfg. Co. 11 Michener, E. S. 89 Northwestern Chemical Co. 24 Prest-O-Lite Co. ....100, 101	Oil Gauges Troy Auto Specialty Co. ....106	Storage Batteries American Battery Co. 97 Geisler Bros. Storage Battery Co. ....114 Schug Electric Mfg. Co. ....110
Carburetors Marvel Carburetor Co. 95 Planhard Mfg. Co. 29	Oils Harris, A. W., Oil Co. 81 Haws, Geo. A. 18 Kellom, Chas. F. & Co. 30 Marshall Oil Co. ....122 New York & New Jersey Lubricant Co. 17 Robinson, Wm. C. & Son Co. ....84, 117 Vacuum Oil Co. ....4, 5	Supplies Auto Parts Mfg. Co. (Milwaukee, Wis.) ....112 Auto Parts Co. (Providence, R. I.) .. 81 Cray Bros. 87 Garage Equipment Mfg. Co. 28 Hollingshead, R. M., Co. ....108 Holzman Auto Supply Co. 85 Metal Body Tank & Fender Co. ....115 35 Per Cent. Automobile Supply Co. .. 84
Cement American Tire & Rubber Co. ....109 Martin, L. G. 30 Motor Accessories Makers, Inc. ....110 Northwestern Chemical Co. 24 Quality Cement Co. 27	Paint Mahoney, Dr. W. F. 30	Tanks Meteor-Auto-Tank-Co. 28 Prest-O-Lite Co. ....100, 101
Chains Baldwin Chain & Mfg. Co. ....26	Patches Horsey Mfg. Co. ....119 Security Co. 28 Selbach Rubber Co. 97 Tingley, C. O., & Co. ....119	Terminals Mac Kae Mfg. Co. 91
Clutches Williams Foundry & Machine Co. ....106	Files Gilmer, Jr., G. Walker. 25	Timer Brackets Brooklyn Machine Co. 28
Compressor Comstock, Geo. S. ....114	Polish Armiger Chemical Co. 20 Gun Metal Finish Co. ....106 Morris, R. W. Mfg. Co. 84 Shannon, T. R. ....110	Timers Benford Mfg. Co. ....123 Mac Kae Mfg. Co. 91 Spengler Optical Co. ....117
Cylinders Rebores Underwood, H. B., & Co. ....18	Publications National Illustrating Co. 97	Tire Chains Atlas Chain Co. ....115 McLain, H. E. & Co. 84 Whittaker Chain Tread Co. 95
Detachable Treads Leather Tire Goods Co. 1	Pumps Auburn Auto Pump Co. 30 Bridgeport Brass Co. 9 Brown Co. 24 Crone, F. G. ....108 Curtis & Co., Mfg. Co. ....120 Hart & Wilder Co. ....110 Hawthorne Mfg. Co. 95 Lobe Pump & Machinery Co. 95 Mayo Mfg. Co. 83 Peerless Accessories Mfrs. 26 Pitner Pump Co. 22 Prest-O-Lite Co. ....100, 101 Troy Auto Specialty Co. ....106	Tire Gauges Allen Auto Specialty Co. ....111 Edelmann E. & Co. 86 Schrader's, A., Son 32
Directories Auto Directories Co. 28	Putty Toledo Auto Devices Co. ....110	Tires Automobile Tire Co. ....120 Diamond Rubber Co. ....124 Excelsior Tire Co. ....116 Empire Tire Co. ....119 Goodrich, B. F. Co. ....112 Great American Rubber Co. 28 Keystone Tire & Rubber Co. ....107 Motz Tire & Rubber Co. ....119 Racine Auto Tire Co. 97 United States Tire Co. 10 Vanderpool, W. ....114
Drop Forgings Williams, J. H., & Co. 23	Radiators Livingston Radiator & Mfg. Co. 96 Rie Nie Mfg. Co. 98	Tire Lining Dayton Inner Tire & Mfg. Co. 86 Double-Fabric Tire Co. ....121 Essex Rubber Co. 16 Inner Shoe Tire Co. 7 K. & W. Mfg. Co. ....4th cover Voorhees Rubber Mfg. Co. ....2d cover Waban Webbing Co. 16
Electrical Supplies Johns, H. W., Manville Co. 25 Grant, H. M. ....114	Radiators Repaired Livingston Radiator & Mfg. Co. 96	Tire Kettles Williams Foundry & Machine Co. ....106
Fire-Proof Cements Johns, H. W. Manville Co. 25	Repair Outfits Atlas Auto Supply Co. ....102 Gem City Liquid Vulcanizer Co. 26 Gray Specialty Co. 16 M. & M. Mfg. Co. 87 Page-Lester Co. ....120 Peerless Cement Co. 97 Richardson Tire Co. 91 Williams Foundry & Machine Co. ....106 Williams Mfg. Co. 30	Tire Molds Williams Foundry & Machine Co. ....106
Friction Clutches Williams Foundry & Machine Co. ....106	Re-Treading Rings Williams Foundry & Machine Co. ....106	Tire Repair Equipment Williams Foundry & Machine Co. ....106
Funnels Dover Stamping & Mfg. Co. ....112	Revolving Cases American Bolt & Screw Case Co. 22	Tire Stock Diamond Rubber Co. ....124 Firestone Tire & Rubber Co. ....105
Gasoline Lighting System Brilliant Gas Lamp Co. 27	Rim Removers Tobey, Wm. L. 29	Tools Buffalo Forge Co. 31 Champion Blower & Forge Co. 14 Garvin Machine Co. 84 U. S. Compass Co. ....109 Wiley & Russell Mfg. Co. ....110 Winchester Machine Works ....112
Gasoline Storage Outfits Scalfe, Wm. B., & Sons Co. 85	Roofing and Building Materials Johns, H. W., Manville Co. 25	Top Dressing (auto) Felton, Sibley & Co. 23
Grinders Heath Foundry & Mfg. Co. ....120	Screw Drivers Mac Kae Mfg. Co. 91	Treads Bricton Mfg. Co. 77 Colorado Tire & Leather Co. 3 Kimball Tire Case Co. ....119 Leather Tire Goods Co. 1 Queen Mfg. Co. 13 Standard Tire Protector Co. ....110 Triple-Tread Mfg. Co. 15 20th Century Tire Protector Co. ....20, 116 Universal Tire Protector Co. ....104
Hose Clamps Catalein, A. G. ....110	Screw Plates American Tap & Die Co. ....114 Butterfield & Co. 86 Wiley & Russell Mfg. Co. ....110	
Ignition Atwater Kent Mfg. Works. ....79 Esterline Co. ....123 Inst. Lighter Co. ....113 New York Coil Co. ....107 Packard Electric Co. 29	Shock Absorbers Sager, J. H., Co. 27	
Inner Casing Western Automobile Supply Co. ....111	Signals American Electric Co. ....110 Automobile Supply Mfg. Co. 22 Edgar Mfg. Co. 95 Randall-Faichney Co. ....115 Troy Auto Specialty Co. ....106	
Jacks Moore, J. C., & Co. 95	Soaps Davies, J. P. Co. 6 Stanley, John T. ....109	
Lamps Butylite ....2d cover	Spark Plug Terminals Mac Kae Mfg. Co. 91	
Lamps (side and tail) Gulde Motor Lamp Mfg. Co. 31 Holt & Beebe, E. 28 Milwaukee Bronze Casting Co. 97	Spark Plug Protectors Mac Kae Mfg. Co. 91	
Lathes Barnes Drill Co. 29 Barnes, W. F. & John Co. 85 Sebastian Lathe Co. 87 Seneca Falls Mfg. Co. 29		
Lighting System Advance Motor Specialties Co. 94		
Locks Blackburn Specialty Co. 95 Globe Auto Lock Co. 23		
Lock Washers K.W. Ignition Co. ....112 Remy Electric Co. 8		
Machines Olmsted's, L. H., Son. 95		
Magnetos K.W. Ignition Co. ....118 Splitdorf, C. F. ....109		
Mailing Lists Auto Directories Co. 28		
Maps Mendenhall, C. S. ....110		

Tops	
Buob & Scheu	114
Tubes	
Prest-O-Lite Co.	100, 101
Turntables	
Automobiles and Accessories Mfg. Co. 24	
Canton Foundry & Machine Co.	83
Turntables for Garage	
Lansing Co.	114
Typewriting Machines	
Fox Typewriter Co.	113
Varnishes	
Arsenal Varnish Co.	104
Felton, Sibley & Co.	23
Valentine & Co.	21
Vehicle Washers	
Perfect Mfg. Co.	114
Vises	
Fisher & Norris	30
Vulcanization	
Johns, H. W. Manville Co.	25
Vulcanizers	
Adamson Mfg. Co.	3d cover
Auto Tire Vulcanizing Co.	111
B-Z-2-Work Steam Vulcanizer Co.	91
Gibney, Jas. L. & Bro.	110
Haywood Tire & Equipment Co.	24
Leader Mfg. Co.	98
Miller, Chas. E.	98
Montgomery Machine Co.	95
National Motor Supply Co.	73
O'Neil Tire & Rubber Co.	110
Rice & Dayton Mfg. Co.	28
Shaler, C. A. Co.	103
Wheeling Stove & Range Co.	108
Williams Foundry & Machine Co.	106
Welding	
Hub Machine Welding & Contracting	
Co.	106
National Welding & Mfg. Co.	114
Waterbury Welding Co.	108
Western Welding & Mfg. Co.	29
Welding by Electricity	
Hub Machine Welding & Contracting	
Co.	106
Welding Plates	
Phillips-Laffitte Co.	123
Welding Powders	
Phillips-Laffitte Co.	123
Wheels	
Jones, Phineas & Co.	112
Wrenches	
C. M. B. Wrench Co.	94
Mac Kae Mfg. Co.	91
Wind Shields	
Conover & Robinson	94
Grossman, E. Co.	85
Vanguard Mfg. Co.	114
Wind Shield Glass Cleaners	
Grossman, E. Co.	85

The Globe Auto-Lock.—This is a device which operates the valve on the gasoline tank from the outside of the car and successfully works out three principles. It prevents theft, it is a safeguard in the garage or on the road and it prevents evaporation of gasoline, which alone it is claimed will save the price of the lock in a short time. Representatives for this device are wanted in unoccupied territory and any of our readers who may be interested are urged to send for circular and prices to the Globe Auto-Lock Company, Canisteo, N. Y., and in doing so please mention The Automobile Dealer and Repairer.

The Voorhees "Ideal" Automobile Rubber Specialties.—A large assortment of rubber repair stock and other automobile specialties for tire work is manufactured by the Voorhees Rubber Manufacturing Company, 18 to 46 Bostwick avenue, Jersey City, N. J. The quality of the Voorhees goods is almost too well known to need commendation in these columns. If your dealer does not keep the Voorhees specialties write direct to the manufacturers as above for catalogue and full particulars, not forgetting to mention The Automobile Dealer and Repairer.

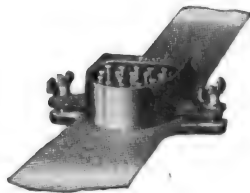
Hagstrom Plugs.—We understand that Ford car owners become enthusiastic in their praise of the Hagstrom Spark Plug, manufactured by the Hagstrom Bros. Manufacturing Company of Lindsborg, Kansas. Dealers everywhere sell these plugs. Consult the advertisement of this company on another page and write to them for a gas tank key and for descriptive matter of their improved suction priming cup and other Hagstrom specialties. In writing kindly mention this paper.

A Quick Working Hose Coupling.—A hose coupling that will not become loose and can be quickly detached and attached is extremely useful both to the owner of an automobile and in the repair shop or in a garage. The Catelain hose clamp is easily adjusted to different sizes of hose, can be put on as often as desired without injury to the clamp or the pipe, and always holds the hose absolutely tight. It is manufactured by A. Catelain, 1446-8 Indiana avenue, Chicago, Ill., and prices and full particulars will be cheerfully sent upon request.

The Model Gas Engine Works.—Arrangements have recently been made by which the Model Gas Engine Company is to build in Pittsburgh one of the largest plants of the kind in the country. The Peru, Ind., factory is of course still to be maintained as usual and the firm is to continue to build in both factories the highest class of motors possible.

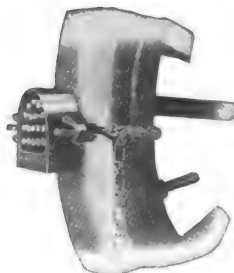
An All Around Vulcanizer for \$4.

The illustrations give some idea of a new and unique vulcanizer which weighs but 3 pounds complete with the entire repair kit. It goes by the name of the Universal Auto Vulcanizer, because it does all kinds of work, and it



Vulcanizing Tube.

is claimed it will perfectly vulcanize a patch on the road or at home in 15 minutes. It is so simple that any one can use it, requires no attention, and the price is so low that no one should be without one. Fundamental and basic patents have recently been secured and the company manufacturing it say they



Vulcanizing a Casing.

are prepared to protect their rights. This vulcanizer will especially commend itself to car owners who want to do their own tire repairing, and yet who don't care to invest much for an

LIGHT YOUR LAMPS THE MATCHLESS WAY

MATCHLESS AUTO LIGHTING SYSTEM

NO COILS
NO BATTERIES
NO SHORT CIRCUITS
NO GAS WASTE
NO CLAMPS OR NUTS ON BURNERS
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PRICE COMPLETE \$10.00
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ADVANCE MOTOR SPECIALTIES CO.
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We are adding a universal joint to our No. 1 "SILVER KING" and our No. 2 "AUTO QUEEN." "SILVER KING" also has a T with a ball joint which can be used as an adjustable handle socket wrench.

Jobbers ask for Electros and Price.

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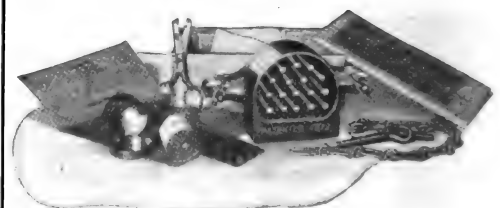
TAKES THE PLACE OF STRAPS

\$5.00 PER PAIR

Try a pair or write for circular.

CONOVER & ROBINSON.
250 W. 54th St., New York

outfit. The advertisement on another page gives further particulars, but if still more information is needed, write the manufacturers, The Adamson

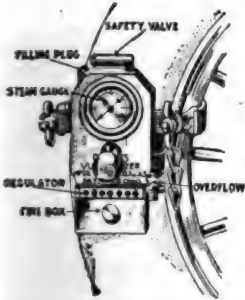


The Complete Outfit.

Manufacturing Company, East Palestine, O., or send the firm \$4, and get the entire outfit, thus being fully prepared for any tire emergency.

A Useful Book.—A comprehensive illustrated book, giving descriptions of motor cars, has just been issued by the Automobile Board of Trade of New York. It is the Ninth Annual Handbook of Gasoline Automobiles, prepared annually for the information of the public who are interested in the manufacture and use of gasoline driven vehicles. The present volume contains 207 pages with illustrations of cars made by the leading manufacturers. Copies of the book may be had by sending ten cents to cover postage, to the Automobile Board of Trade, 7 East 42d street, New York.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

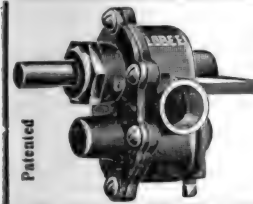


Do Your Own Vulcanizing

Either Tube or Casting, with a Dallas Portable Steam Vulcanizer, which has all the features of a first class Boiler.

Price, oxidized finish, **\$12.00**

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Manufactured by
MONTGOMERY MACHINE CO.
Dayton, Ohio



If you want Good Circulation on your Automobile, Launch or Motor Boat use a **LOBBE PUMP**

Write for Booklet A.
LOBBE PUMP & MACHINERY CO.
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You can use Low Grade Gasoline with the "Marvel."

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You don't want to buy a stolen Auto, but you can prevent your Auto from being stolen with our **Auto Lock Switch**. Put on coil or dash in 10 minutes. Yale key for plug. One operation. No padlock. No rattle. No bother. Write now before your car is stolen, giving name, year and ignition of your car. Moneyback guarantee.

BLACKBURN SPECIALTY COMPANY
1124 Prospect Ave., S. E., CLEVELAND, OHIO

Motz Tires.—Our New England subscribers will be interested in the fact that the Standard Tire and Rubber Company of 104-106 Portland street, Boston, Mass., has taken the agency for the entire New England States for the Motz tires.

The Blackburn Automatic Lock Switch.

An automobile switch that is operated through a Yale pin tumbler lock and can be applied very easily to any coil box has been brought out by the Blackburn Specialty Company, 1124 Prospect avenue, Cleveland, O. This lock switch is used in place of the regular switch on coil or dash where it is accessible to the driver from his seat. It is operated by simply inserting the key in lock and turning slightly to right or left. This action brings the switch-bar across the battery or magneto contact points and the key can be removed only when the circuit is broken.

When switch is mounted on coil, it is impossible to short-circuit the wiring as the current must pass through the coil to be effective, and it cannot do



The Blackburn Automatic Lock Switch.

this until the switch-bar is placed in the proper position by the key.

The switch case cannot be removed even after the screws are drawn except when the key is inserted and turned to the releasing point. The lock is the famous Yale make and cannot be picked. Each lock is furnished with three keys. This lock switch is applicable to any ignition system, the contacts being arranged to suit the different wirings. The one operation of removing the key locks the car, which makes it a very simple and effective automobile lock. The price is \$5.00 with a refund guarantee. Address the Blackburn Specialty Company as above and mention this magazine.

Concerning Best Plugs.—We take pleasure in reprinting the following which appeared in the Trouble Department of this magazine in August, 1911, issue from one of our valued subscribers: "I am a very careful reader of the 'Trouble Department' and extremely interested in all that pertains to a Buick Model 10, and through your kindness in furnishing me with the address of some who have had trouble similar to mine, have corresponded with owners of these cars. Noticing the advertisement of The Best Ignition Equipment Company of their Plug on page 37 of your issue April, 1911, I sent for a set of them, their claim being that they were particularly adapted to the Buick cars. I have tried these plugs out most thoroughly and the unpleasant 'jerk' has disappeared and I sincerely wish that owners of Buick 10 could know what a difference the use of these plugs has made in the running of my car and should you have reports of trouble with these cars I think that you would confer a great favor by suggesting that a trial be made of these plugs."

Interested readers should write for particulars to the Best Ignition Equipment Company, 200 West 64th street, New York City, and mention this magazine.



You Don't Have to Stoop Down

The Lift that means Long Life.
Can be used without stooping down—lift starts when lever is at right angle

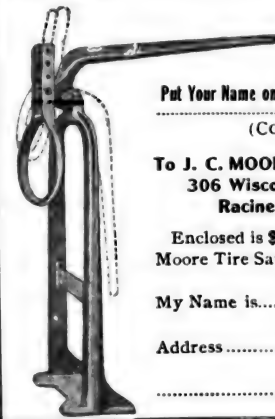
to jack up your car with these powerful leverage jacks. An easy down stroke of the lever lifts the car clear of the garage floor without the least effort or bending over.

Moore Tire Saving Jacks

save your back and muscles and do the work in so much shorter time—just 30 seconds to jack up all four wheels of the heaviest car. A child can use them. Fit any auto wheel hub and are instantly applied by slipping loop over hub and pressing down lever.

FULL LINE OF AUTO LIFTING JACKS

We make six different kinds of auto lifting jacks, each up to the high standard of our famous Tire Saving Jack. If your dealer doesn't sell Moore Tire Saving Jacks a complete set of four will be shipped to you direct if you send \$6.50 and



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(COUPON)

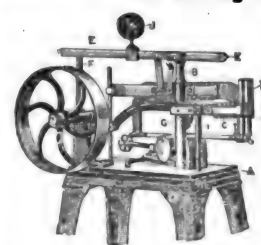
To **J. C. MOORE & CO.,**
306 Wisconsin St.,
Racine, Wis.

Enclosed is \$6.50 for set of four Moore Tire Saving Jacks.

My Name is.....

Address.....

L. H. OLMSTED'S Improved Power Hack-Saw Machines For Sawing Metals



Made in various sizes and provided with saw guides that insure perfect work and prevent saws from breaking.

The vise for holding work can be placed at any angle and a pointer is attached to move along a graduated segment to indicate various angles.

The saw has a true horizontal movement in all positions.

List prices from \$15 up.
Send for circular.

L. H. OLMSTED'S SON, Hasbrouck Heights, N. J.

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Classified Advertisements

Under this head will be printed advertisements of **Second Hand Cars Wanted** or for **Sale, Accessories of any kind Wanted** or for **Sale, Shops for Sale or Rent, Situations or Help Wanted, Second Hand Tools or Machines For Sale or to Exchange**, at the uniform price of three cents a word, including the name and address, for each insertion, payable in advance. No advertisement will be inserted for less than 50 cents, however small. Remittances may be made in postage stamps or in any convenient way.

Classified Advertisements

Address **MOTOR VEHICLE PUBLISHING CO.**, 71-73 Murray Street, New York.

AUTOMOBILE INSTRUCTION—The West Side Y. M. C. A. Automobile School gives a practical course in shop and road practice in four or eight weeks, day or evening. Provision made for out of town men. 322 West 57th St., N. Y. City.

SEND US YOUR BROKEN CYLINDERS, and crank-cases to be welded at less than one-quarter the cost of new ones. Work absolutely guaranteed. Pay only after testing. Write for references and prices. Waterbury Welding Co., Waterbury, Conn.

PATENTS SECURED—C. L. Parker, Patent attorney, 962 G Street, Washington, D. C. Inventor's handbook upon request.

STEAM CAR CORRESPONDENCE SCHOOL. Finely written and illustrated course. Only school in world. Circular sent. 520 Fourteenth St., Denver, Col.

FOR SALE—"Steam Car Owners." Myers Kerosene Burner—Something new. Send for circular. 729 West Colfax, Denver, Colorado.

TIRES—Another big sale on: 10,000 Goodriches, Michelins, Diamonds, etc., at unheard of reductions. Every size for every rim. Guaranteed. Shipped on approval. Also 5,000 Motor Cycle tires. Sacrificed. The Automobile and Cycle Company, 1769 to 1787 Broadway, New York City.

"SOME RARE BARGAINS, which we purchase from manufacturers' surplus stock. All goods warranted first-class and if not satisfactory, you can return to us and purchase money will be refunded. Mohair touring car tops, \$13.50; roadster, \$12.50; fine tire covers, \$1.00 each; trunk racks, \$1.00; robe rails, \$1.00; foot rails, \$1.00; rumble seats, upholstered and painted, \$10.00; Gemmer steering gears, \$12.50; Ford model "T" radiators, \$18.00; gas tanks, \$12.00. Autoparts Mfg. Co., Detroit, Mich."

\$3.00 KINGSTON FLOATING BALL, single adjustment, 1 1/4 in. vertical intake carburetors, slightly used but perfect. Automobile Appliance Co., 1712 Michigan Ave., Chicago, Ill.

FIVE THOUSAND MILES for \$1.50. I will send full particulars how to make four good reliners that will prevent blow-outs and punctures for 50 cents. Address E. G. Tople, 1005 Broad St., New Castle, Ind.

BEAVER 2-cyl. water cooled motor 20 h.p. at a bargain, also lot of auto parts. Will take small two-cylinder motor as part payment on Beaver motor. Salineville Model & Machine Works, Salineville, Ohio.

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NEW 32x3 Tires at \$3.00. New 32x3 Tubes at \$1.80. Warranted first-grade Morgan & Wright. G. & J. and Hartford make. New Mohair Tops at \$12.50 each. Complete with curtains. Will fit all makes of cars. \$25.00 Gas Tanks at \$12.50. Just a few of our bargains. We have more in lamps, etc. Autoparts Mfg. Co., 441 Twombly ave., Detroit, Mich.

TOPS—Until further notice, runabout top \$22, touring car tops \$35. C. G. Meyer & Son, Tiffin, Ohio.

CYLINDERS REGROUND, and fitted with new pistons and rings for \$15.00 per cylinder. We make parts and cut gears of all kinds. Send us your old parts and we will repair or duplicate them in record time. Cracked cylinders, gear cases, etc., welded and made good as new. Aluminum, bronze and brass castings of every description. Phosphor bronze bushings in the rough carried in stock. Address, The Adapt Machinery Company, 1624 Wabash avenue, Chicago, Ill.

DON'T FORGET.

FORD AGENTS—WE MAKE A SPECIALTY of Dust Hoods to cover Top when Clashed down for Model T Ford 1910-1911-1912 Cars. Write for prices, also Cellulosa best Substitute for Glass used in Automobile and Buggy Storm Fronts, Side Curtains, Etc., Sheets 20 x 36 in. 36c., 12 x 20 in. 36c., 18 x 20 in. 45c., 20 x 24 in. 68c. Postpaid, Haews Storm Front Co., Coldwater, Mich.

STOPS AUTO THEFT

Yale Lock Switch. By mail \$5.00. Yale key for plug. One operation. Blackburn Specialty Co., 1124 Prospect avenue, Cleveland, O.

ALL MAKES MAGNETOS AND COILS bought, sold, exchanged, or repaired. Bargains in used magnetos. Pellets Magneto Exchange, Dept. M, 1461 Michigan avenue, Chicago, agent for Eisemann Magneto.

SCORED CYLINDERS repaired \$12 each. No enlargement of bore—no need for new pistons and rings. Send piston with cylinder. Absolutely reliable method. Better investigate and save money. References, testimonials, and full details on request. Waterbury Welding Company, Waterbury, Conn.

BROKEN CRANKSHAFTS, cylinders, crankcases, flywheels, gear teeth, pistons, perfectly welded and machined ready to replace. Guaranteed and references. Machinery up to 5 tons welded. Atlas Welding Works, 74-76-78 Irving St., Rahway, N. J.

MOTORING SALESMEN — SALESMEN MOTORING. Ask us if territory you propose sales-touring is being worked by our agents. Snappy accessory. Long commission. Yale Company, Oestburg, Wis.

CARS WANTED—Why not trade your automobile for a good lot, farm or improved city property. No better investment than Texas property. Auto Exchange Co, San Antonio, Texas.

MODEL T FORD OWNERS—You need my valve adjusters. They make a good car better. More power, better mileage, less noise. A good proposition to owner agents. Ira Lavender, Webster City, Iowa.

FORD OWNERS, REPAIRERS—We have the best valve adjuster and silencer ever made. Will refund money if not so. \$1.50 by mail. Townsan Auto Specialty Co., Mitchell, S. D.

NOTICE TO FORD OWNERS—We are now supplying Ford owners with a rear axle truss or support. Clamped to axle in two minutes, stops rear axle and drive shaft vibration, stops bending the housing, stops the buzz or noise so common to Ford cars, stops gear stripping. Price \$3.00. We guarantee satisfaction. Sunvold & Thang, Sacred Heart, Minn.

BARGAINS.

New Fine Casings.

36x4 1/4 in.	\$19.00
36x4 in.	15.50
36x3 1/4 in.	10.50
36x4 in. new tubes	3.50
36x4 1/4 in.	3.75
36x5 in.	4.00
34x4 in.	3.50
32x3 1/4 in.	2.90
30x3 1/4 in.	2.75
Kingston floating ball, single adjustment carburetors, 1 1/4 in. vertical intake, slightly used but perfect..	3.00
New Four-cylinder Heinze coils.....	16.50
New Leavitt timers, 4 cyl., improved type	3.00
New round gasoline tanks, double compartment, 12x30 in.	2.50
Double bucket roadster seats, upholstered and painted	27.50
Exhaust horns, all sizes	1.75
Magnetos, new Splittdorf Model T, with coil, 4 cyl.	35.00

LOTS OF OTHER BARGAINS. Automobile Appliance Co., 1712 Michigan Ave., Chicago, Ill.

\$15.00 BUYS one 34x4 heavy tire in good repair, with nearly new carrying case complete. \$550.00 takes one model "O" White steamer in fine shape. Been in fine hands, had the best of care and run but little. Wight Optical Company, Northampton, Mass.



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PROVED BY TEST

Radiators made or repaired for any type car.

Have a new radiator made for your car and increase its value 25 per cent.

Our corps of expert repairmen at your service. All charges based on time consumed. Results guaranteed.

Send in your old radiator and get estimate.

LIVINGSTON RADIATOR AND MFG. CO.

136 W. 52d St., New York City

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FORD OWNERS!—Send us a postal and we will mail you our catalogue, containing many new and useful "specialties" for your car, which will save you time and money. Auto Improvements Co., 53-D Court St., Bristol, R. I.

TIMKEN AXLES—New Timken rear axles, complete with hubs, hub caps, bearings, internal and external brakes, \$125.00; New Timken front axles, complete with hubs, hub caps, and bearings, \$25.00. Automobile Appliance Co., 1712 Michigan Ave., Chicago, Ill.

N. E. AUTO LIST—Weekly registrations of all N. E. States as reported, \$10 yearly; year book \$3. Auto List Co., 138 Pearl St., Boston.

BARGAINS in high grade panel top delivery bodies with doors in rear. We have a quantity to close out, \$70.00 to \$100.00. Write for prints and particulars. The Barndt & Johnston Company, Columbus, Ohio.

FOR SALE—One new two-cylinder 14 h.p. water cooled Auto engine. Price, \$85.00. Address Charles Black, R. R. 5, Box 38, Scribner, Neb.

FOR SALE—Motor cycle, 3 1/4 horse, \$75.00. Automobile buggy, new, 18 horse, \$26.00. Block chains new, one-half price, tubes, etc. Address Stanley Drozd, Duncan, Neb.

500 NEW pressed steel auto frames 163 in. long, 38 in. wide. Send for sketch. \$10.00 each. Lucas & Son, Bridgeport, Conn.

AUTOMOBILE boilers bought, sold and repaired. Lucas & Son, Bridgeport, Conn.

AUTO HEEL RESTS, 75 cents per dozen. Send for circular. Lucas & Son, Bridgeport, Conn.

FOR SALE—Six new cast iron brazing machines. A low price for the lot. Address for particulars Box 153, Wilder, Vt.

FOR SALE—Mitchell Model "K" five passenger touring car, A1 condition, has had small mileage. For particulars address Mitchell, care of Automobile Dealer and Repairer, P. O. Box 654, New York City.

AGENTS WANTED—Big money can be made to handle a No. 1 article; sells for \$3.50 comp. The article is for saving gasoline for automobiles. Moller Brothers, 700 Betz Building, Philadelphia, Pa.

FOR SALE—One pair Bricsom treads 28x3. First ten dollar draft gets them. Run 1,500 miles. Address J. Peters, Jr., Florissant, Mo.

EXHAUST Dry Batteries Renewed. Send 25 cents. G. K. Watson, Farrell, Miss.

Send for free sample of The Automobile Dealer and Repairer.

MOTOR VEHICLE PUBLISHING CO.,
71-73 Murray St., New York.

A Fine Spark Plug.—Automobilists, motor boatmen, motor cyclists and operators of motor trucks are equally enthusiastic about the new feature spark plug, known as the "E. Z." and manufactured exclusively by The Autoparts Manufacturing Company of Jersey City. The "E. Z." plug enjoys the distinctive feature of being capable of adjustment without the aid of a wrench or tool of any kind in a period of four seconds. A simple twist of the hand locks the "E. Z." plug to 2,000 pounds pressure. This plug can be adjusted on a motor boat without stopping the boat. Aside from the quick adjustable no-wrench feature, the "E. Z." is a thor-

oughly good and absolutely reliable spark plug in every way. It positively holds full compression by asbestos, having no metal to metal joints. It is designed for service on high power motor boats and automobiles as well as low speed commercial cars of any capacity up to 10 tons. The Autoparts plant and producing facilities are severely taxed in an effort to keep abreast of their orders.

Worn Annular Ball Bearings.—It doesn't take much wear to render an annular ball bearing unfit for use, necessitating a new bearing which is an expensive proposition. Few, perhaps, know that such worn bearings may be reground and fitted with new balls, and made as serviceable as new again, at a nominal cost. This is the business of the Ahlberg Bearing Company (not inc.), 2632 Michigan avenue, Chicago, Ill.) Mr. Ahlberg, president of this company, has designed a series of machines for the regrounding of annular ball bearings, which will pave the way for some great ball bearing economies in motor operation. These machines are excellently contrived, and have been approved by the experts who have had a chance to look them over, and will be a great boon for all motor users, both pleasure and commercial.

Mosler Spit Fire Plug.—These plugs have been increasing in popularity for fourteen years, and are regarded as a standard, by many leading automobile manufacturers. They are made to fit any engine, and any thread. A red tag is fastened to the plug inside of the box, to identify it. The workmanship and material of this plug are very strongly guaranteed, and they work equally well on battery or magneto. The trade is warned to beware of imitations. Watch for the red tag, and insist on the Special Octagonal Brass cap marked "Mosler, New York." Correspondence is invited. Address your inquiries to A. R. Mosler & Co., New York City, and mention The Automobile Dealer and Repairer.

No More Brass Polishing.—The Gun Metal Finish Company of Decatur, Ill., is making a metal finish which when applied to brass causes it to turn black. It resists the heat and is very durable. They also have a dull gun metal finish that resembles rubber. It is applied with a brush and dries hard and elastic in half an hour. Their glossy rubber finish dries with a high gloss and is so elastic that it will not chip off when exposed to extremes of heat or cold. See the announcement of this company on another page and write to-day for samples which will be promptly forwarded to any reader of this paper.

Woodworth Treads in Europe.—The Leather Tire Goods Company has recently arranged to establish agencies for Woodworth treads in all the larger towns and cities of Europe, and it is also expected that a factory will be opened there in the near future. Mr. A. H. Hedding is to take charge of the business on the continent of Europe, and he will carry a stock of Woodworth treads in London.

We understand that W. D. Edenburn, formerly connected with Indianapolis "Sun" as manager of their automobile department, is now connected with the Remy Electric Company of Anderson, Ind., as publicity and assistant advertising manager. This company seems to be on the lookout for talent wherever it can be found.

WHAT WOULD YOU DO?

Auto speeding down hill—brakes refuse to work!

AUTOMOBILE EMERGENCY AND REPAIR MANUAL.

Tells you what to do for almost every conceivable automobile emergency. Not Technical. Fits the pocket. Registration fees, laws and penalties of all states. 50 cents, prepaid.

NATIONAL ILLUSTRATING CO., 1 Park Place, New York.

PEERLESS TIRE REPAIR KIT

\$1.00, Express Prepaid.

THE PEERLESS CEMENT CO.
AKRON, OHIO.

STORAGE BATTERIES

IGNITION LIGHTING VEHICLE

RECTIFIERS

ALL SIZES FOR CHARGING FROM A. C. CIRCUIT

AMERICAN BATTERY COMPANY, 1136 Fulton St., Chicago. Est. 1889

Let Us Show You How SER-VIS TIRE LININGS

Reduce Your Tire Expense 40%

SELBACH RUBBER CO.,
Atlantic Avenue, Boston, Mass.



ELECTRIC STAR HEADLIGHTS

Water and Dust Proof.
Strongest Auto Lamps Made.
Write for Catalog.

Change bulbs without removing front glass.
MILWAUKEE BRONZE CASTING CO.
119 Clinton St., Milwaukee, Wis.

CHAMPION SPARK PLUGS

Special designs for every type of motor made.

CATALOGUE MAILED ON REQUEST.

CHAMPION SPARK PLUG CO., Toledo, Ohio.

ALUMINUM MATTING

For Automobile Running Boards, Foot Boards, Motor Boat Floors, etc.

Cleaner, neater and more serviceable than any other matting.

Write for samples and information.
METALLIC AUTOMOBILE MATTING CO.
295 Main St. Rochester, N. Y.

THE LITTLE STEERSMAN

is a safety steering device, which makes any car 100% easier to control, and prevents accidents when the steering gear breaks, or a tire bursts.

Write for full information to the Modern Auto Appliance Company, 10 Kinderhook St., Cutham, N. Y.

Gardner Garage Pumps.

Within the reach of all. Don't say you can't afford a compressor until you get our prices and Special Proposition.

Our new catalog is ready for distribution. Send for a copy.

THE GARDNER GOVERNOR CO.,
Station R, Quincy, Ill.

RACINE PURE GUM TIRES

Racine Auto Tire Co., Racine, Wis.

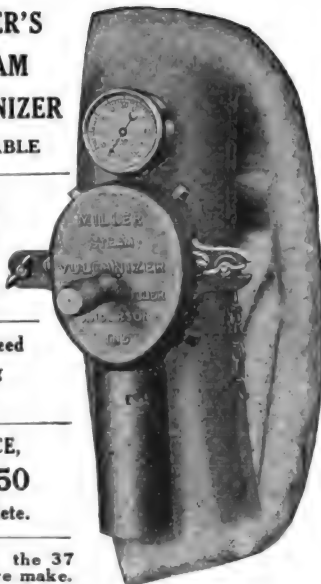
MILLER'S STEAM VULCANIZER PORTABLE

Repairs
Casings
and
Tubes.

Guaranteed
Nothing
Better.

PRICE,
\$7.50
Complete.

One of the 37
kinds we make.



MILLER'S REPAIR MATERIALS

Standard Tread Stock,
per lb. \$.70
High Grade Tread Stock,
per lb.85
Cement Stock for Casings 1.25
Cement Stock for Tubes... 1.75
Inside Tube Patching Rub-
ber, cured one side, per lb. 2.00
No Cement Patches, per
dozen packages..... 2.50
No Cement Patching Rub-
ber, sheet form, per lb... 2.00
Fabric Sea Island Cotton,
17½ ounces, one or two
sides..... 1.10
Fabric Common Tire
Cloth, 15 ounces, one or
two sides..... .65
Fabric Common Bicycle
Tire Cloth, 10 ounces,
one or two sides..... .65
Pure Fine Para Gum, for
making acid Cure or Cold
Patching Cement..... Net, 2.00
Miller's Three in One Re-
pair Stock..... 1.20
This stock repairs casings and
tubes and makes cement, and
eliminates the necessity of car-
rying a large variety of repair
material.

The above prices subject to
5 per cent. discount for cash
with order, or in 100 pound
lots or over, 10 and 5 per cent.

Write for our 44-page Catalogue,
which illustrates large kettle
vulcanizers; adjustable sec-
tional vulcanizers; inner tube
vulcanizers; inside vulcanizers;
retreading vulcanizers; adjust-
able segment iron cores, tread
rollers, power wrapping ma-
chines, steam boilers, grinding
stands, circular wire brushes,
grinding wheels, full line of
small rubber tools, tire lasts,
automatic steam traps, steam
regulators, air bags, gas tub-
ing, auto bumpers, baby car-
riage tires, inside and outside
blow-out boots, no cement
patches, repair stocks, hand-
made bicycle tires, motor cycle cas-
ings and red tubes of extra quality.

MILLER'S IMPROVED ADJUSTABLE, SECTIONAL VULCANIZER

The kind that repairs everything in the Tire line—all sizes of bicycle, motor cycle, auto and
aeroplane tires, also 4 to 6 inner tubes at one time. Made and designed by the man who
originated and patented the Cavity Vulcanizer, so generally used throughout the world.

One of the
37 Kinds
We Manufacture.



Prices Complete with
Bead and Tread
Molds, \$95.00

Price Complete with-
out Bead and Tread
Molds, \$42.00

MILLER'S TIRE RELINERS—4 PLY ADHESIVE—EXTRA QUALITY

Net Prices—Cash with Order 5 per cent. off.

Each	Each
28x2½ inches.....\$1.95	31x4 inches.....\$3.20
28x3 ".....2.80	32x4 ".....3.40
30x3 ".....2.55	33x4 ".....3.60
32x3 ".....2.75	34x4 ".....3.95
29x3½ ".....2.55	35x4 ".....4.15
30x3½ ".....2.80	36x4 ".....4.30
31x3½ ".....3.05	40x4 ".....4.80
32x3½ ".....3.20	34x4½ ".....4.45
34x3½ ".....3.40	35x4½ ".....4.85
36x3½ ".....3.95	36x4½ ".....5.15
30x4 ".....3.05	36x5 ".....5.40

MILLER'S TIRE RELINERS—3 PLY ADHESIVE—REGULAR QUALITY

Net Prices—Cash with Order 40 and 5 per cent.
off List Prices. Can Furnish Any Size Not Mentioned.

CHAS. E. MILLER. Anderson Rubber Works,
ANDERSON, IND., U. S. A.

RieNie RieNie RieNie RieNie RieNie

“Why Let the wet rain pen-
etrate your Auto Top
and wet your hat?

RieNie Mohair Top
Water-Proofing
will fix your wea-
ther-worn leaky Mohair Top with one coat.
Dries over night. Sample can for one top,
prepaid; \$2.50.

RieNie Hard Rubber Air Drying
Enamel dries over night
with a High Gloss finish as
good as any baked Japan. A sample will
convince you. Prepaid, \$2.50.

German Radiator Compound

Should a man pay \$5 or \$10 to have his
radiator Soldered? Our sample can will fix
at least 3 leaks. Prepaid 75c. Guaranteed.

We manufacture enamels for brass fixtures
and cylinders in several colors, both air drying
and for baking. Send for Catalog A.

RieNie Manufacturing Co.
Minneapolis, Minn. U. S. A.

RieNie RieNie RieNie RieNie RieNie

HAVING YOUR SHARE OF TIRE TROUBLES?

SURE YOU ARE!

Like most other troubles they start small
but grow fast. The time to cure them is
when they start or before!
That bad spot in your tire—
small cut maybe—means a
blowout after the sand and
water get in their work.

IN A HURRY?

No time to take it
off and send it in
for repairs today!
Run it a while any-
how! A little
later,

BANG!!!

The chances are
that when this hap-
pens you will be
somewhere out on the road, possibly **MILES FROM HOME**. Do you
realize your predicament? Annoyance? Cost for repairs and worst
of all, **THE DELAY**, waiting for the repair man? By owning a

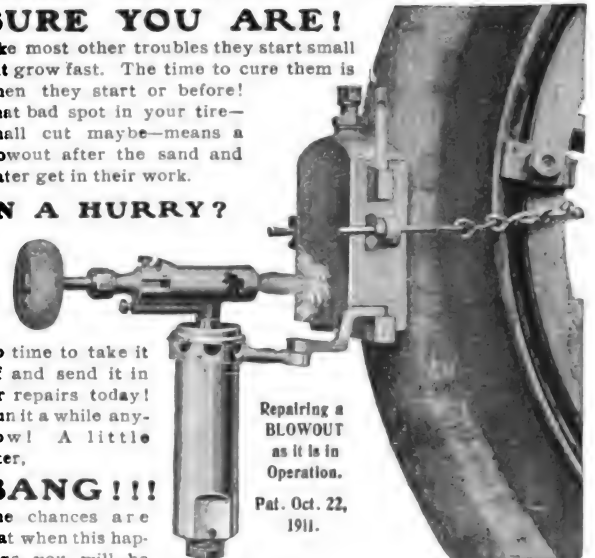
LEADER PORTABLE VULCANIZER

You can repair the trouble right on the spot in a few minutes and do
it yourself.

Send us your address on a postal and let us tell you all about
it by return mail; it will pay you.

THE LEADER MFG. CO., Cleveland, O.

Agents Wanted in Every Locality.



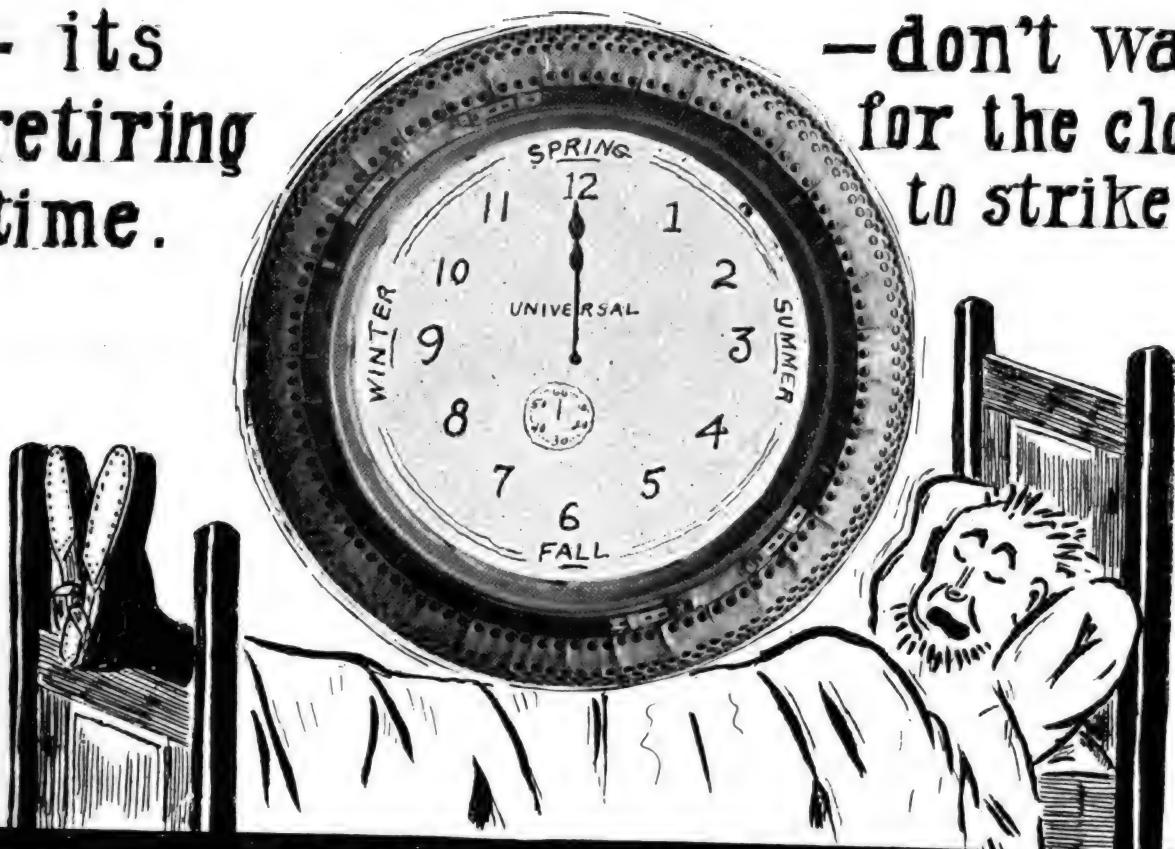
Repairing a
BLOWOUT
as it is in
Operation.

Pat. Oct. 22,
1911.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

— its
retiring
time.

—don't wait
for the clock
to strike "13"



**RETIRING TIME? "YES."
BUT DON'T GO TO SLEEP
WHEN YOU RE-TIRE YOUR CAR!**

You had tire trouble and expense aplenty last year. Don't this year. Equip your car with "UNIVERSAL" tire protectors and be relieved of all annoyance, delay and expense due to tire injury. But "UNIVERSAL" users can tell you better than we of their genuine worth and merit. Here's what Dr. Leisenring of Wayne, Nebraska says: "Send me two 30x3½ treads as soon as possible. The treads which I placed on my car two years ago are still on, and my tires have not cost me one cent for repairs. They are apparently good for another 6000 miles."

"UNIVERSAL" adjustable and detachable full treads or tire protectors fit any and all makes of tires. They're as easy to install or remove as the ordinary quick detachable tire. Cost nominal. Service phenomenal. Order a set from your dealer today. It means reducing your tire bills to the minimum. If there isn't a dealer in your locality we have an attractive proposition for you.

Write us today. Don't wait for the clock to strike 13.



Universal Tire Protector Co.

Lock Box 678 D

ANGOLA, INDIANA, U. S. A.

Prest-O-Starter

Safe—Sure—Efficient—Economical

FOR FOUR CYLINDERS **\$20**

FOR SIX CYLINDERS **\$25**

The simplest, best and safest automatic Starter you can find at any price.

Thousands of America's best cars are being equipped with this starter by leading manufacturers who have carefully investigated **all** starting systems.

Prest-O-Starter has been tested and proven absolutely safe in all motors.

Besides its elimination of tiresome, dangerous cranking, the acetylene gas keeps cylinders free from carbon.

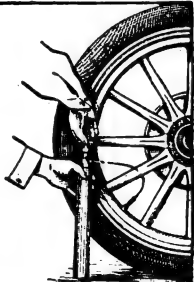
Easily and quickly installed by any mechanic—full directions for equipping any multi-cylinder car.

Consider its worth and its price—you cannot afford to be without it on your car.

The entire Prest-O-Lite organization stands behind this starter. Any of our 15,000 exchange agencies will give you full information, or write for our literature explaining all features.

For Every Wise Motorist

If you have ever pumped a flat tire on a dusty road on a hot day, you won't have to be told the advantages of the



Prest-O-Tire Tube

Carry one or half a dozen in your tool kit. Just attach to tire, turn the puncturing valve, and your tire is filled.

Guaranteed not to injure the tire.

Green Label Tire Tube fills one deflated tire, 3½" or smaller—price complete with puncturing valve, \$3.00; extra tubes, \$1.00.

White Label Tire Tube fills one deflated tire, 4" or larger—price complete with puncturing valve, \$3.25; extra tubes, \$1.25.

Empty tubes exchanged for refilled tubes for 20 cents at any of our 15,000 Prest-O-Lite agencies. Ask your dealer or write us.

Insist Upon Prest-O-Lite

Don't take a car equipped with a generator. 350,000 experienced motorists use it—practically every good car is equipped with it.

The Prest-O-Lite Tank besides providing the best, the greatest quantity, the surest and safest light you can get, opens the way to the Prest-O-Starter, the ideal starting system.

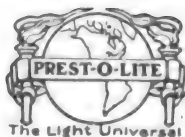
One tank provides both light and power.

Prest-O-Lite service covers practically every city, town and village in the country where automobiles are used.

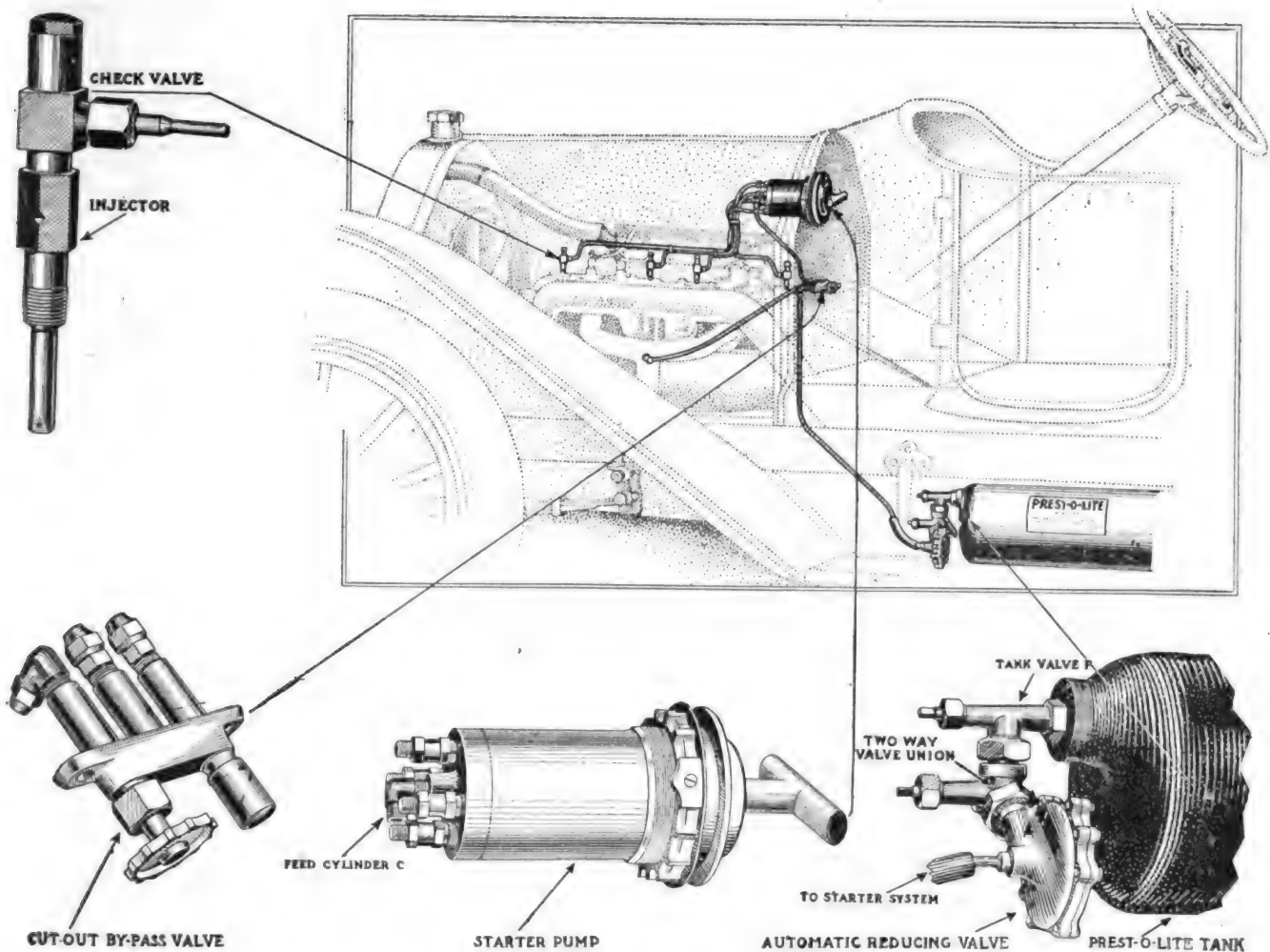
Don't be misled with an imitation—something "just as good." No other lighting and starting system equals Prest-O-Lite. Insist upon it.

The Prest-O-

EAST SOUTH STREET,



Branches at Atlanta, Baltimore, Boston, Buffalo, Chicago (2), Cincinnati, Cleveland, Dallas, Detroit, Denver, Indianapolis, Jacksonville, Kansas City, Los Angeles, Milwaukee, Minneapolis, New York, Omaha, Philadelphia, Pittsburg, Providence, St. Louis, St. Paul, San Francisco, Seattle.



Study This Illustration

It explains thoroughly the simplicity of the Prest-O-Starter. The entire system can be quickly and easily installed on any multi-cylinder car in a few hours.

For months, our factory has been pushed to the limit in supplying this system to leading motor car manufacturers.

We could not make Prest-O-Starters fast enough to provide them to dealers.

With increased facilities we are now able to offer them at retail—the demand is sure to exceed what we can supply.

Get in touch with your dealer today. Get an order in at once if you want prompt delivery.

Lite Company

INDIANAPOLIS, IND.

Charging Plants at Atlanta, Cleveland, Dallas, E. Cambridge, Hawthorne, Ill., Indianapolis, Long Island City, Los Angeles, Minnesota Transfer, Oakland, Omaha, Seattle, Waverly, N. J.

Foreign Agencies at Honolulu, H. I., Manila, P. I., San Juan, P. R., Toronto, Can., Vancouver, B. C., City of Mexico, London, England, Berlin, Germany, Australia.



To The Dealer

Since the details of The Prest-O Starter were first announced, months ago, we have had requests each day, from dealers who were anxious to supply the demand for a reliable Starter.

The great demand from manufacturers of cars made it impossible for us to fill dealers' orders with our Starter factory working night and day.

By building special machinery and increasing our facilities, we are now able to offer this great starting system to the public.

Already nearly all of our increased output for months to come will be taken to fill dealers' orders now on hand.

If you want to take care of the demand for the Prest-O-Starter among your customers you should get your orders in quickly.

If you are not in touch with the Prest-O-Starter proposition, write now.

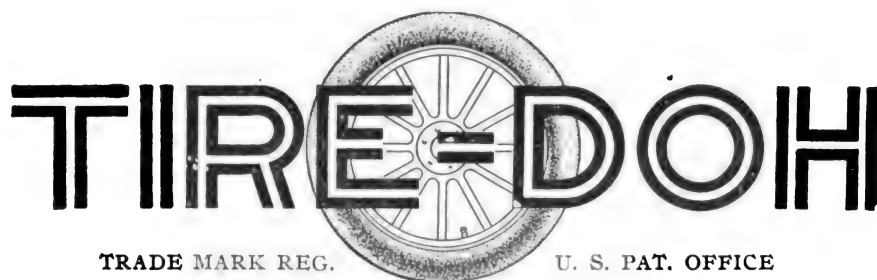
Our reserve stock will be quickly exhausted and we cannot promise prompt deliveries later.



Here's all you need to permanently repair the worst puncture or blowout

Absolutely without vulcanizing and at *one-tenth* its cost you can *permanently* repair *every* injury that can happen to a *tube* or *casing*. You can do it *easier*, *quicker* and *better* than by vulcanizing—whether in the *shop* or on the *road*—with no tools but your two *hands* and an outfit of

Here's the only form you can buy it in.

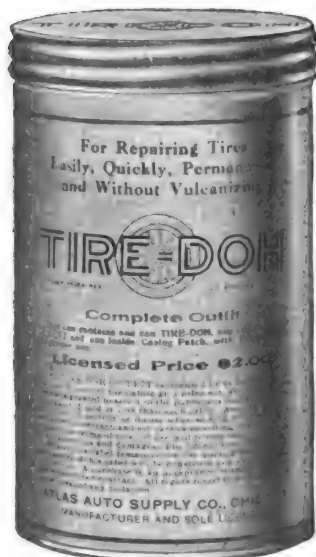


By promptly repairing cuts, sand pockets and blisters with Tire-Doh you can *double* the life of your casings and *save* nine-tenths of your tire repair expense.

This outfit comes only in a white enameled can, shown here, and consists of one can of TIRE-DOH, one can of TIRE-DOH CEMENT and one Inside Casing Patch. Neither Tire-Doh nor Tire-Doh Cement is ever sold separately or under any other label. The complete outfit is necessary to make satisfactory repairs. Price \$2.

Try it at our risk. If it does not do exactly as we say your money will be promptly refunded.

Atlas Auto Supply Co., 77 E. Adams Street, Chicago, Ill.



Twenty Dollars More a Day-Easy

Vulcanizing pays big profits. You know that your Shaler Type B vulcanizer is the most profitable piece of equipment you ever put in your garage at anywhere near the price.

Now why don't you complete your outfit with a vulcanizer that will enable you to mend the largest *casing blow-outs*—mend them so well that you can guarantee the repairs to hold?

SHALER ^{Type C} Vulcanizer

This is even a better money maker than Type B. It mends the big blow-outs that you thought could only be repaired by some expensive, unwieldy apparatus that would take up as much floor space as an automobile. It takes only a couple of feet of bench room. Any boy who can wash a car can do the work, and rarely does a blow-out repair bring in less than \$5.00—mostly profit.

You can make four or five such repairs in a day. There's very little work to it. Instead of cutting away a lot of rubber from the tread and tediously building it up again you simply cement a few

layers of fabric on the inside of the tire, clap it on the heater, fill up the cut on the outside with Para gum, put on your Type B and let it cure. Type C applies the heat to the inside, your Type B to the outside, welding the new material into place under an enormous pressure.

Such a repair is stronger than the rest of the tire. *You can guarantee it.* In order to give out, the patch on the inside would have to be blown right through the casing; practically a physical impossibility.

Are you interested in increasing your profits? Too bad we can't tell all about Type C on this page.

Garage Booklet Free.

We have just received the first edition of our new Garage Booklet "*Common Sense about Tire Repairs.*" There is a copy for you if you fill out this coupon and mail it to us with your letterhead or card showing that you are in the Garage business.

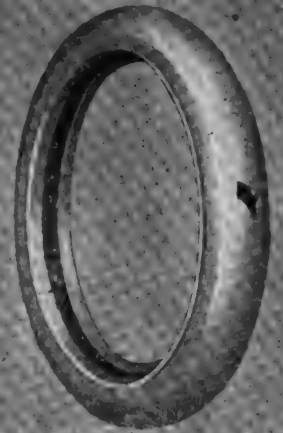
Auto Owners ask for Free Copy of "Care and Repair of Tires."

C. A. Shaler Co., 803 4th St., Waupun, Wis., U. S. A.

Please send me a **free** copy of the famous garage handbook, "*Common Sense about Tire Repairs.*"

Name.....

Address.....



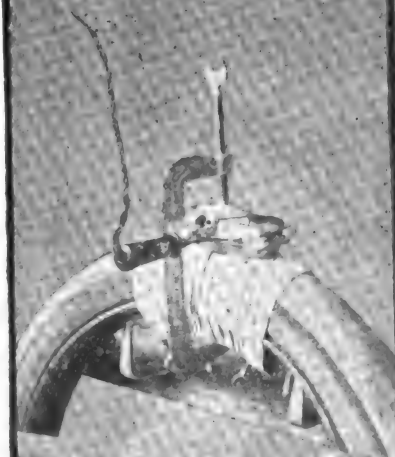
THE TIRE



THE VULCANIZER



GET THEM TOGETHER



TYPE B & TYPE C
MAKING \$5.00 FOR YOU

Please mention the Automobile Dealer and Repairer when writing to advertisers.

Paint Your Car Yourself?

You can
do it
and save
\$25
to
\$75



You can
do it
and save
\$25
to
\$75

Cole 30 painted at home with ARSENAL VELVET GLOSS
Any one can use our materials. You don't need previous experience.
Velvet Gloss is Indispensable for Garages and Taxicab Companies.

ARSENAL VELVET GLOSS is the new dull finish for motor cars which has come to be so popular for roadsters, torpedo and toy tonneau cars, and is equally good for any car. It is in two coats with the proper brush for application and will cover solidly over any previous color. Anyone can satisfactory paint a car with Velvet Gloss by following the simple directions on the cans. Apply a coat to-day, another to-morrow, and use car the third day. Then, in six months or a year, if your car looks a little shabby, simply give it another coat of Velvet Gloss. You can eliminate your painting bills by using Velvet Gloss.

ARSENAL VELVET GLOSS is made in the following colors: French Gray, Battleship Gray, Ebony Black and Apple Green, and in two sizes of outfits. No. 1, sufficient for cars like the Hupmobile, Ford, etc., costs \$5, and No. 2, for larger cars, costs \$7. Order an outfit to-day and paint your car yourself.

THE ARSENAL SYSTEM of repainting motor cars (for novices) should be used by those desiring a high gloss finish. It is in three coats ready mixed for use, together with proper brushes and full instructions. The Arsenal system is made in the following colors: Red, Maroon, Green, Battleship Gray, Orange, Cream, Apple Green, Black, two shades of Blue, and Brown. There are three sizes of outfits: No. 1, for small runabouts, costing \$7; No. 2, for Model T Fords and small touring cars, costing \$8; and No. 3, for large touring cars, costing \$9. If two colors are desired—that is, the body one color and the wheels another—add 75 cents to cost of each outfit. Hundreds of car owners have saved thousands of dollars by doing their own painting with the Arsenal system.

HOOD AND FENDER OUTFITS. A great many new 1912 cars will have the hoods and fenders enamelled black regardless of the body color of the car. We make outfits for this purpose in two coats and one color only, black. No. 1 outfit is \$2.75, and No.

2 is \$5. Motorists should have one of these outfits in the garage at all times, as they are invaluable for touching up scratched or marred surfaces on the car. These outfits are complete with brush.

REVARNISHING OUTFITS are for those who only wish to revarnish the car and are in two sizes. Small size suitable for Ford T, \$2.75; and large size for touring cars, \$4.50. We furnish one kind of varnish for body and another kind for chassis. Outfits are complete with brush. These varnishes are of the highest quality and are the same as is used on new cars.

Enamelled Lamps the Style for 1912

ARSENAL LIQUID GUN METAL is the only air-drying brass enamel of proven merit on the market. It has proven its worth on thousands of cars during the past four years.

Arsenal Liquid Gun Metal is a specially prepared coating to be used on lamps, radiator, etc. It is applied with a brush the same as paint or varnish, and makes a lasting gun metal enamel on these parts. Can be removed at any time without injury to the brass. To keep clean, wipe off with a cloth, or wash the same as other parts of car. No polishing, and it sticks on.

Arsenal Liquid Gun Metal is for sale by leading dealers everywhere, but if yours does not have it in stock, we will forward a can, express prepaid, on receipt of \$1 (in the U. S. only).

Our booklet—"The Car Beautiful"—describes these materials in detail, and is the only work of its kind published. Send for it to-day. It is free.

ARSENAL VARNISH CO., 2501 Fourth Avenue, ROCK ISLAND, ILL.
Specialists for Motorists

The Trade Drawing Value of "Firestone" REPAIR STOCKS

Make them indispensable to the dealer or repairer aiming to lead. Their supreme quality insures satisfaction, stimulates business, and holds custom.

The "Firestone" Reputation

which has placed "Firestone" Tires far in the lead, is back of "Firestone" repair stocks. This is your protection and guarantee for quality and results.

Firestone Accessories

Cementless Patches.
Cure-Cut Gum.
Wrapped Tube Patches.
Molded Tube Patches.
Lace-on Boots.
Blowout Patches.
Emergency Inside Patches.
Repair Materials in Airtight Packages.
Tire Tape. Talc.
Complete Repair Kits.
Pumps. Air Pressure Gauges.
Valves and Valve Parts.

Our Proposition Saves and Makes Money For You

Don't fail to write for it to-day. The biggest future business possible for you depends on this proposition. If you haven't already received our newest book, "Pneumatic Repairs, How to Make Them," be sure and ask for it. It is **the only complete text book published for Repair Men.** It will prove invaluable to you.

The Firestone Tire & Rubber Co.

"America's Largest Exclusive Tire and Rim Makers,"

AKRON, OHIO, U. S. A.

MAKE MONEY REPAIRING TIRES

BOLTLESS TIRE KETTLES



CASING REPAIR VULCANIZERS
AIR COMPRESSORS and TANKS
STEAM BOILERS
INSIDE PATCH VULCANIZERS
TUBE REPAIR VULCANIZERS
POT HEATERS and STEAM VULCANIZERS
COIL SPRINGS FOR RETREADING
RETREADING MOLDS
ROTARY RASPS
WIRE BRUSHES, Etc., Etc.

The Boltless, Quick Opening Tire Kettle and other devices shown in our New 1912 Catalogue insure best results from the smallest investment.

With this kettle you can cure a retread as easily as a sectional repair. **There is not a single bolt to tighten.**

Give your customers quick service by curing retreads as fast as they are built up.

You can make money repairing tires either as part of a garage and general repair business or as a separate venture. Requires very little capital to equip a shop completely with the best tire repairing outfit in the world. The equipment can be paid for and a good profit made by the first season's work. Every motorist must have tires repaired—every motorist in your vicinity is a possible customer for tire repairing.

Get the right kind of equipment—one that produces work that you can guarantee—the Akron-Williams Tire Repair Equipment which was designed by practical tire factory repairman.

Localized heat is the secret of the Akron-Williams. Three separate steam chambers in each of our sections, our exclusive patented feature, limit the curing process to the repaired part.

Proof that the Akron-Williams is the best is the fact that the big tire manufacturers use it—Firestone, Goodyear, Diamond, Republic, Pennsylvania, Revere, Hartford, Consolidated, Empire, Manhattan, Shawmut and many other tire manufacturers are among our customers. They know by experience what is most practical. We can equip a tire repairing plant of any desired capacity. Don't delay getting into this profitable business.

Get into correspondence with us to-day.

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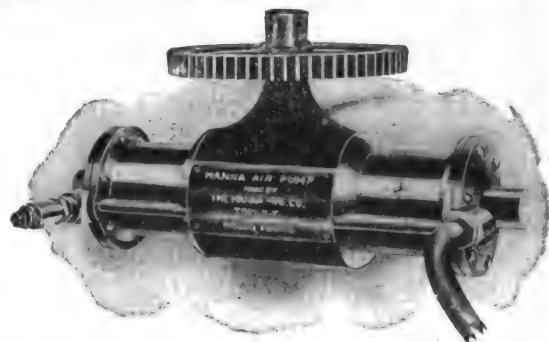
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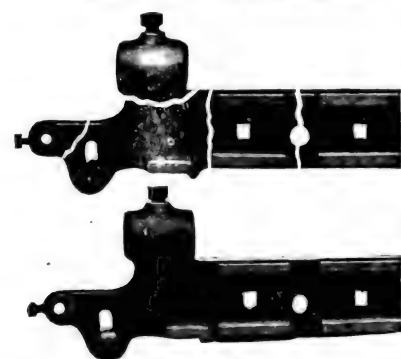
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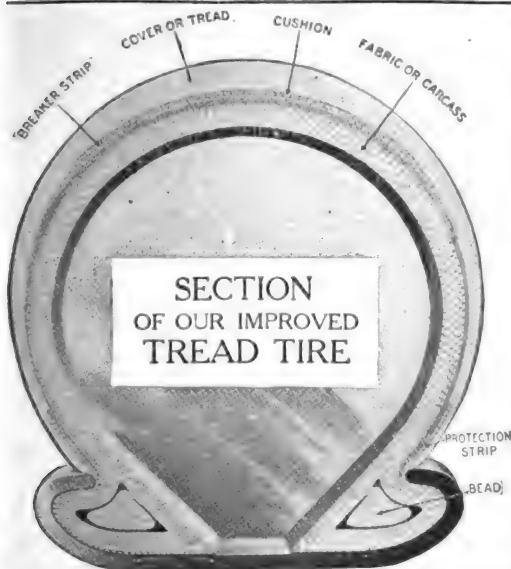
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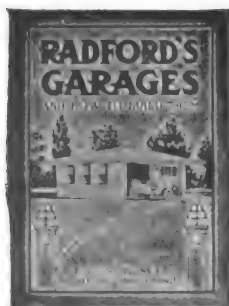
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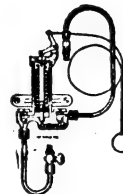
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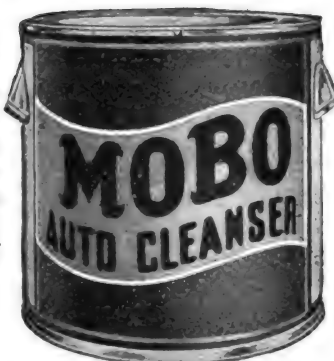
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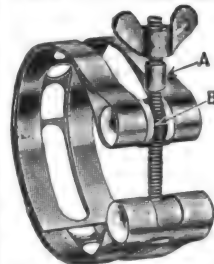
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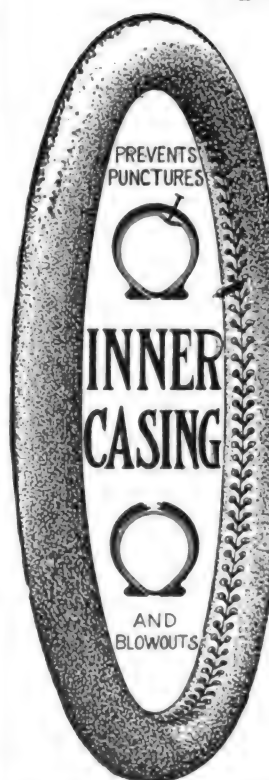
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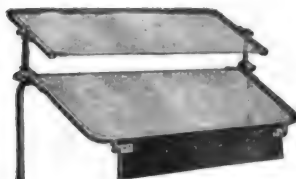
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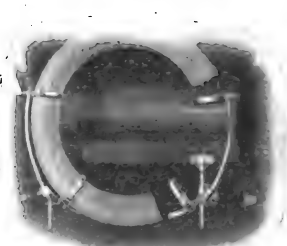
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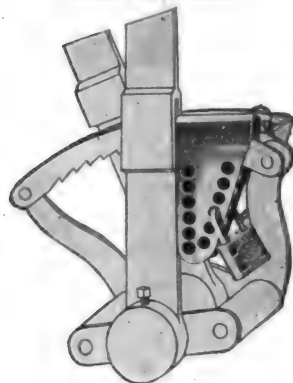
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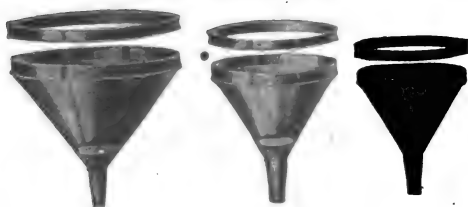
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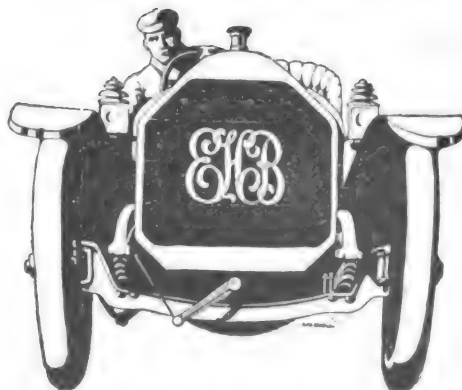
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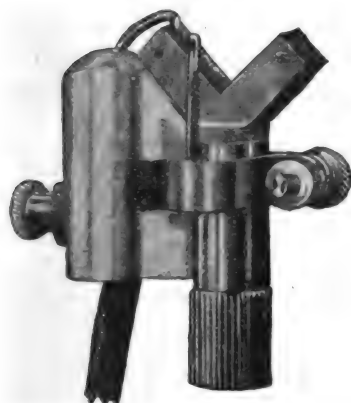
This is the New Fox No. 24

Nothing equals this New Fox. It is a typewriter that will meet the approval of the most critical operator. A single demonstration will convince anyone of this. We will make it at our expense if you will give us your permission.



The New Model No. 24 is a Visible Writer having a carriage to accommodate paper 10½ inches wide—Double Forward Carriage Release—New Patented Removable Ribbon Spools, automatically reversing and oscillating the ribbon—Tabulator—Back Space Key—Two Color Ribbon—Stencil Cutting Device—Card Holder—Interchangeable Carriages and Platens—Indestructible Key Tops—Light Touch—Easy Action—Noiseless—Durable—Sent on Ten Days Free Trial—Sold on Easy Payments.

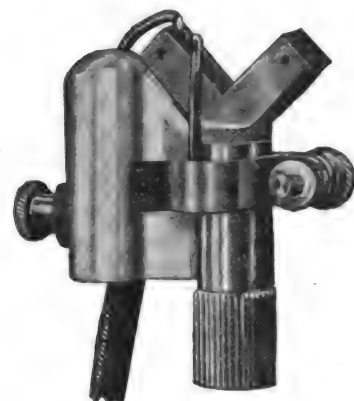
Fox Typewriter Company
6604-6614 Front Street
GRAND RAPIDS, MICHIGAN



The INST LIGHTER

Will Go On Any Car.

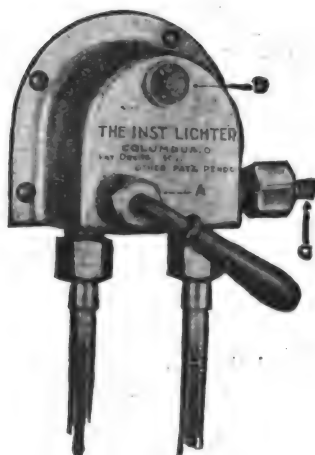
The Only Successful Lighter.
Five Years' Experience in Making.



Lights the gas headlights from the driver's seat.

No connection with engine ignition system.

Lights while the car is running or standing still.



To Operate, Open "A" and Push "B"

Standard or special equipment on Packard, Lozier, Marmon, Seagrave, Wolseley, Franklin, Selden, Cino, Republic, McFarlan, Moon and forty other standard cars.

These engineers *know*.

Order it put on your new car at the factory.

Complete Equipment, \$15.00.

THE INST LIGHTER CO., Columbus, O.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

AUTO CASINGS AND TUBES—Fresh Stock

Maple Grove Farm,
Underwood, Minn., July 7, 1911.
Wm. Vanderpool, Springfield, Ohio:
Dear Sir—I find your rubber goods
just as good as those I have been
paying twice the price for.
(Signed) OSCAR SWANSON.

Thornton, Texas, March 13, 1911.
Wm. Vanderpool:
Dear Sir—Please quote prices on
your tires. Dr. Bass of Barry, Texas,
recommends them very highly. I
want to try them. My wheels are
28x3 1/4.

Yours, etc.,
(Signed) W. A. BEDFORD, M.D.

Versailles, Ky., Mar. 15, 1911.
Mr. Wm. Vanderpool:
Dear Sir—You see I am back again
this season looking for good casings.
Kindly send me your prices on 32x3 1/4
casings and any others you are selling.
(Signed) DR. S. A. BLACKBURN.

	CASINGS		TUBES			
	Guaranteed	2nd Quality	Guaranteed	By Mail add	Reliners	By Mail add
28x3	\$9.85	\$8.50	\$2.75	\$0.27	\$2.75	\$0.33
30x3	10.50	9.25	2.85	.38	2.85	.84
30x3 1/4	14.95	12.75	3.75	.42	3.40	.37
32x3 1/4	15.75	13.25	4.25	.48	3.50	.39
34x4	22.25	19.50	5.75	.....	4.80	.53

Guaranteed Motor Cycle Cases and Tubes.
Single clincher only, Bailey Type tread.

28x3 1/4 case, \$7.75; tube, \$2.50; by mail, \$2.65.
28x3 1/4 case, \$8.30; tube, \$2.65; by mail, \$2.82.

Send for price list on all size Cases, Tubes and Reliners. On receipt of 10¢ I ship, allow examination. Many have re-ordered. If you order a Tube or Reliner and want it sent to you by mail, send Post Office Order for total amount. On account of my growing trade in the South send your order, if located in the South, to Jacksonville, Florida.

WM. VANDERPOOL

Main Office

SPRINGFIELD, OHIO

Branch, JACKSONVILLE, FLA.

Buckeye City, O., March 24, 1911.
Mr. W. Vanderpool:
Dear Sir—Please send me your net
price on 28x3 Q. D. Clincher. I bought
from you last year which gave good
satisfaction. Wishing early reply,
Very truly,
(Signed) D. L. SWARTZ.

Keokuk, Iowa, June 17, 1911.
Wm. Vanderpool, Springfield, Ohio:
Dear Sir—We purchased two casings
from you July 15 last year, 32x8. They
have given satisfaction and we would
like to ascertain what your price is at
the present time. Hoping you will
give the above prompt attention, we
are

Respectfully yours,
(Signed) PRICE BROS.

Franklin, Tenn., April 14, 1911.
Mr. Wm. Vanderpool:
Dear Sir—Kindly send me one inner
tube 34x4 for a 1905 Clincher rim, by
express C. O. D. at once. I bought
one of your cases last year and it has
been very satisfactory. Kindly hurry
this off. Yours very truly,
(Signed) C. B. PENNOCK.



Adamantine Screw Plates

Cutting 1x72, 2x56, 3x48, 6x32, 8x32 inches, - - - - -	\$2.25
" 10x24, 12x24, 14x20, 3/16x24, 7/32x1/4x20 inches, - - - - -	2.25
" 1/16x72, 3/32x56, 1/8x40, 5/32, 3/16x24, 1/4x20 inches, - - - - -	2.25
" 2x56, 4x32, 6x32, 8x32, 10x24, 12x24 inches, - - - - -	2.25

LOOK—PREPAID

Send for Catalogue of Threading Tools

AMERICAN TAP & DIE CO., Greenfield, Mass.

RUTENBER

The hood that conceals a
Rutenber Motor has nothing to conceal.
Guaranteed for Life.

Western Motor Co., Marlon, Ind.

FIBRE

Sheets, Rods, Tubes and Special
Shapes for Automobile Work

H. M. GRANT

6 Murray Street, New York

WELDING

\$\$\$\$\$\$\$ Saved on Auto Parts.
Ship all broken Castings to us.
Save time and\$\$\$\$\$\$\$

NATIONAL WELDING & MFG. CO., Incorporated
Manufacturers of complete Welding Plants
Welders and Brazers of all Metals

525 Jackson Boulevard Chicago, Ill.

AUTO TOPS

Write for catalog and prices. We
can save you money.

BUOB & SCHEU,
Court and Broadway, Cincinnati, Ohio.

HOWARD E. COFFIN'S LATEST CAR

Is the New Self-Starting HUDSON "33."
Its motor is dust-proof. It is enclosed. It has nearly
a thousand fewer parts than the average car. It is 3
years ahead of other cars. Get the latest car, the New
Self-Starting HUDSON "33."

HUDSON MOTOR CAR COMPANY
7018 JEFFERSON AVENUE DETROIT, MICH.

MCINTYRE

TRUCKS DELIVER THE GOODS

600 lbs. to 6000 lbs. capacity. All steel
chassis. Send for Catalogue R and
agency terms to 2101 W. 7th St.

W. H. MCINTYRE CO.
Vehicle Builders Since 1866.

Auburn

Indiana

VANGUARD BALL BEARING WIND SHIELD

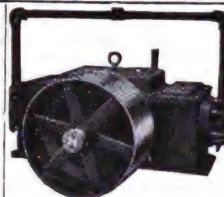
Absolutely Automatic.

This shield operates with more ease than
any other.

Write for discounts to
Vanguard Mfg. Co., Dept. "G," Joliet, Ill.

PORTER'S BOLT CLIPPERS
"Easy" "New Easy" Allen-Randall

To cut 5-16, 3-8, 1-2, 5-8, 3-4 inch.
H. K. PORTER, EVERETT, MASS.



Garage Air Compressors

Several sizes and styles
especially for garage
work.

Simple and reliable.

Hundreds in use.

Also larger sizes.

GEO. S. COMSTOCK,
Mechanicsburg, Pa.

Automobile Turntables

Every Garage needs one. Write for Catalog R. T.,
a postal will bring it, it tells all about turntables.

LANSING-COMPANY

Formerly LANSING WHEELBARROW CO.

100 Cedar St., Lansing, Mich.

New York Philadelphia Chicago Kansas City
Minneapolis San Francisco Boston



"PERFECT" VEHICLE WASHERS

save labor, water and hose.

CATALOGUE

PERFECT MFG. CO.

ALBANY, N. Y.

GEISZLER

NON-SULPHATING

STORAGE BATTERIES

LIGHTING AND IGNITION

GEISZLER BROS. STORAGE BATTERY CO.

BEST BY 517-520 West 57th Street SEND FOR
TEST New York City CATALOG

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Jericho ONE TONE Horn Jubilee CHIME TONE Horn

The Signal of a Gentleman—Warns Without Offence

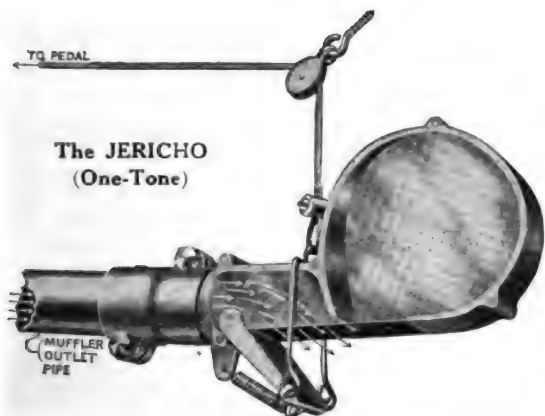
Jericho is superior to bulb horns, electrical horns and all other exhaust horns.

It is superior to the bulb horn because it is equally suitable for use on crowded city streets or winding country roads.

It is superior to electrical horns because it costs nothing to maintain the Jericho.

It is superior to all other exhaust horns because Jericho is the **only** exhaust horn that absolutely **will not clog**.

Equip **your** car with a Jericho or Jubilee and motor without anxiety.



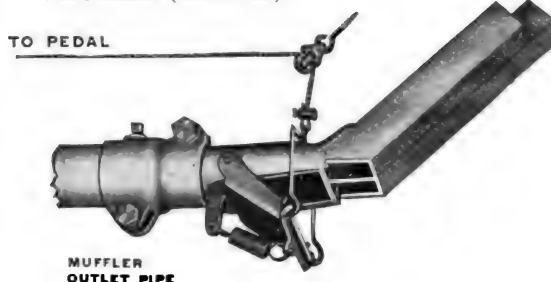
The JERICHO
(One-Tone)

Jericho costs
\$7, \$8 and \$9,
according to size.

Jubilee costs
\$8, \$9 and \$10
according to size.

Sold by all dealers
or direct from us.

The JUBILEE (Chime-Tone)



Send for our free BOOKLET D about Jericho and Jubilee and other
auto. accessories.

THE RANDALL-FAICHNEY CO., Boston, Mass.

ATLAS CHAINS.

The recent decision of Judge Lacombe in the New York Circuit with reference to chains manufactured by this Company should not in any sense be accepted by the trade as final.

Favorable decisions with reference to snug fitting chains have been rendered in other Circuits, the most recent of which is the opinion of Judge Angell of Detroit, under date of Dec. 18, 1911, who held that a snug fitting chain was NOT an infringement.

Being assured by eminent counsel that ATLAS CHAINS do not in any way infringe upon Parson's Patent as defined by the Court of Appeals in Chicago, July 27, 1911, we have already taken steps to carry our case to the Court of Appeals in this Circuit, where the matter will receive prompt and full consideration.

Pending the decision of the Court of Appeals, ATLAS CHAINS will only be manufactured and sold as a non-creeping chain, and we solicit orders therefor.



ATLAS CHAIN COMPANY

Bush Terminal

BROOKLYN, N. Y.



SEATS
\$10.00 to \$35.00

**TOPS
WIND SHIELDS
LAMPS
TANKS
HOODS
RADIATORS
AMMETERS
SPARK PLUGS**

**Seats and Bodies
for any car**

Special seats for the Maxwell, Buick, Reo, Ford, Brush, Hudson, Mitchell or any car. Special Bodies made to your drawing. When writing, please give name and model of your car.

FENDERS
\$10 to \$20



METAL BODY TANK @ FENDER CO.
414 Canal Road, N. W., CLEVELAND, OHIO

Please mention the Automobile Dealer and Repairer when writing to advertisers.

TIRES. TUBES. TIRES.

1912 STANDARD MAKES.

FREE SPECIAL OFFER FOR THIS MONTH ONLY.

\$3.00 Button Tire Cover given away with every purchase of tires. These tire covers are guaranteed water-proof and dust-proof and will be furnished in any size.

Highest grade stock, comprising of the best manufacturers. Cannot advertise names on account of the reduced prices we are selling them at.

Every tire is guaranteed brand new, perfect in every respect, and are not more than six months old. Some of these have the names of the makers on and others are buffed.

We thoroughly examine and test every tire and tube under heavy pressure to detect any weakness before shipping.

These are not the kind usually advertised. Nothing but the best stock is quoted in this ad.

Casings to fit Clinchers, Quick Detachable or Dunlop Straight Side Tires.

Size	Casing	Tube	Size	Casing	Tube
28x3	\$9.50	\$2.50	35x4	\$22.00	\$5.25
30x3	10.75	2.75	36x4	19.50	5.40
32x3	10.50	3.00	37x4	22.50	5.75
28x3½	12.00	3.00	32x4½	20.00	5.50
29x3½	14.50	3.15	33x4½	23.00	5.60
30x3½	14.50	3.75	34x4½	23.50	5.75
31x3½	15.00	3.75	35x4½	24.50	6.00
32x3½	15.00	3.90	36x4½	25.00	6.10
34x3½	15.75	4.15	37x4½	25.00	6.20
36x3½	15.00	4.25	34x5	20.00	6.00
30x4	16.50	4.60	35x5	25.50	6.25
31x4	17.00	4.75	36x5	26.00	6.50
32x4	17.50	4.90	37x5	28.00	6.75
33x4	19.00	5.00	37x5½	30.00	7.00
34x4	19.50	5.10			

Take advantage of these prices and free offer, as we cannot guarantee how long these prices will stand good.

We guarantee these tires and tubes to be strictly 1911 and 1912 goods.

We are one of the oldest and largest tire mail order houses in the United States, and you do not have to hesitate to send us an order with cash accompanied, as we can refer you to any Commercial Agency or Bank in New York, as to our references.

We agree to refund your money if goods are found unsatisfactory upon receipt.

We Ship Goods Subject to Examination.

INSIDE TIRE PROTECTORS.



Prevent blow-outs, punctures, and greatly increase mileage. These tire protectors are made from 3 to 6 ply of Egyptian fabric, with a self-seal flap reinforcing the rim and sides, always the weakest parts. Tube pinches are eliminated by the use of these protectors.

Order a complete set of them and save 100% on your tire expense.

Size	Reg. Price	Cut Price	Size	Reg. Price	Cut Price
28x2½	\$4.65	\$2.40	35x4	\$7.00	\$4.90
28x3	4.75	2.60	36x4	7.75	5.00
30x3	4.90	2.85	32x4½	7.25	5.00
30x3½	5.25	3.85	34x4½	7.50	5.10
32x3½	5.50	3.55	35x4½	7.60	5.25
34x3½	5.75	3.95	36x4½	8.00	5.50
30x4	6.20	3.75	34x5	8.10	5.60
31x4	6.25	4.00	35x5	8.25	5.75
32x4	6.40	4.20	36x5	8.50	6.00
33x4	6.60	4.40	37x5	9.00	6.50
34x4	6.75	4.75	37x5½	9.25	6.75

Owing to the fact that our profits are very small, we sell for cash only, and under no circumstances otherwise.

C. O. D. orders filled if 10% is accompanied with order, to show good faith.

Send for complete list.

EXCELSIOR TIRE CO.,
1777 Broadway, New York City, N. Y.

"20th Century" 1912 Guaranteed Treads

NON-SKID and PUNCTURE-PROOF



Enjoy your car to the utmost during the WINTER months. Protect yourself in advance against danger, annoyance and EXPENSE. Don't stop short of the best for your own car—equip it now with

"20th Century" Treads.
Stop your troubles.
Save your money.

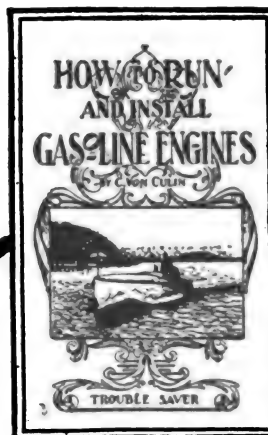
DALLAS TAXICAB CO., of Dallas, Texas, say:

"The purchase by us of over One Hundred TREADS is within itself sufficient recommendation for your Product. We are ENTIRELY SATISFIED. They are reducing our Tire Bills nearly one-half."

If we can satisfy a Taxicab Company, whose cars go through such hard service, we can satisfy every Auto Owner who will give us the chance.

Write, 'phone or wire your order to factory. Ask for our Booklet "Tire Sense."

20th Century Tire Protector Co.,
Main Office and Factory, Dallas Office
Midlothian, Texas. 411-12 Slaughter Bldg.



THIS little book was written especially for beginners. Either the man who uses an engine for pleasure or profit, but who has not time to study a technical book.

It gives full details in connection with running gasoline engines, stated in simple language that anybody can comprehend. It contains numerous illustrations.

A copy will be sent you on receipt of the price, 25 cents, in postage stamps.

Motor Vehicle Publishing Co.,

71-73 Murray Street,
NEW YORK CITY.

AUTOLINE

TRADE MARK

¶ A first aid to perfect motoring—and where you would least expect it—the lubricant.

¶ AUTOLINE is the efficient lubricant. You get *all* the energy and power out of your motor—you will enthuse over the smooth well-balanced hum of your engine.

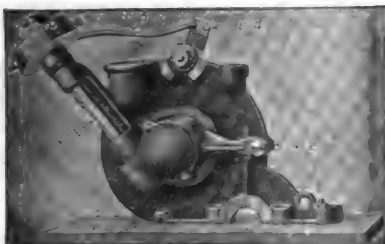
¶ AUTOLINE is no experiment—eighty years of experience in the making of lubricants back of it. Refined from Pennsylvania crude—absolutely carbon free—filtering through bone charcoal does it—and made in a grade for every type of motor.

¶ For your motor's sake you should use AUTOLINE.

¶ At 15 branches—dealers—garages.
Write for the booklet "How to Use Autoline."

¶ And write *today*.

WM. C. ROBINSON AND SON CO.
1509-15 Thames St.
BALTIMORE, MD.



Ford Car Elevated Timer

Places the timer in an accessible position for proper care and repairs. Can be installed in 30 minutes.

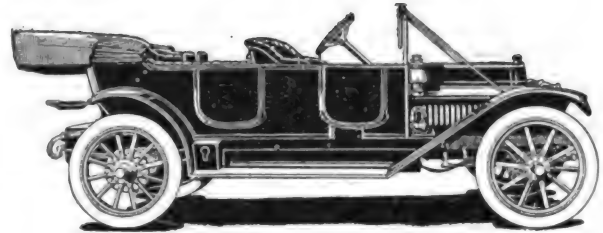
Why not install one for spring work?

Write for Circular. Special Prices Now.

SPENGLER OPTICAL CO., Geneva, N. Y.



Why Cartercar owners are so enthusiastic—



The Cartercar owner drives his car with perfect confidence. He knows that if a roadway is passable for any sort of vehicle he can go through easily, even though it may be impossible for other cars, which is often the case.

He has any number of speeds—which he can change at will, noiselessly and easily, with a single movement of the control lever. He can drive beside a walking person or at a 50 mile rate. This excellent control makes the Cartercar ideal for crowded streets.

By employing a Friction Transmission instead of the usual gears the Cartercar is strong where other cars are weak. It has no clutch to slip—and no gears to strip or howl.

This transmission is extremely economical with power. The Cartercar will easily climb a 50% grade and go through very bad muddy and sandy places. And in addition to this remarkable efficiency it is more reliable. There are just two unit parts—a friction disc and a fibre faced wheel. Compare this with the complicated gears of the ordinary car.

A patented noiseless chain, running in a constant oil bath, transfers the power to the rear axle. This drive requires no attention except a new supply of oil about once a year.

Of course, the Cartercar has all the new ideas of motor car construction, such as full floating rear axle, three-quarter elliptic rear springs, self starter, large wheels, long wheel base, etc.

Five splendid models—ranging in price from \$1200 to \$2100, which includes complete equipment. If you want a car that will give you perfect service three hundred and sixty-five days in the year you should know about the Cartercar.

Let us send you catalog and full information.

WRITE TODAY.

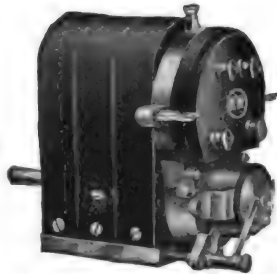
Cartercar Company
PONTIAC, MICHIGAN

Branches: Detroit, New York, Chicago, Kansas City.

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The K-W High Tension Magneto

Model J
Guaranteed
to Start Auto
Engines up
to 30 H. P.



No Coil
No Timer
No
Batteries
4 Cyl., \$50
6 Cyl., \$55

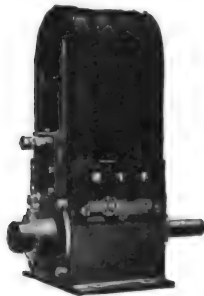
Extremely simple—nearly half less parts than any other Magneto. Perfectly reliable.

We make larger Magnetos for larger engines.

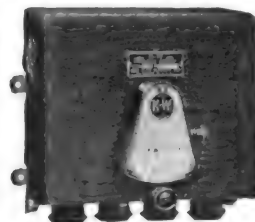
If you cannot gear-drive a High Tension Magneto, use one of our \$35.00 Low Tension belt or friction-drive Magnetos and a K-W Spark Coil.

K-W Low Tension belt or friction-drive Magnetos run the lights at night and can be switched off in the daytime or used for ignition with coil and timer. High Tension Magnetos are for Ignition only.

The new K-W Switch is now furnished free on all K-W coils and the K-W Master Vibrator. Switch only.....\$2.00



Low Tension.....\$35.00
Belt or Friction Drive. Used with K-W Coils for ignition. NO Moving Wires. NO Brushes. NO Commutator. Runs in Ball Bearings. Starts engine without batteries.



The K-W Spark Coil.
Single Cylinder.....\$12.00
2-Cylinder.....18.00
4-Cylinder.....30.00
6-Cylinder.....42.00
Has its winding
GUARANTEED FOREVER
against breakdown.

The K-W Electric Road Lighting Outfit \$50.00

This outfit is the same as our \$15.00 Ford Lighting Outfit with the addition of a \$35.00 Low Tension K-W Magneto, which can be mounted on almost any car to run the lights.

The Simplest Electric Light Outfit in the World

NO Storage Battery to Sulphate or Short Circuit.
NO Commutator or Brushes to make trouble.
NO Complicated Cut-Out to go wrong.
NO Delicate Ammeter or Voltmeter.
NO Difficult Electrical Connections.

WE PAY THE EXPRESS East of the Mississippi River or to the Mississippi on points beyond on any of our goods, when cash accompanies the order.

Write for CATALOGUE 17

THE K-W IGNITION CO.
2817 CHESTER AVE. CLEVELAND, OHIO, U.S.A.



FORD OWNERS The Master Vibrator

Will give you

One Vibrator instead of four separate adjustments,

Hotter Spark, preventing sooty plugs and carbonizing.

Perfect Timing, equal to a High Tension Magneto.

Easy Starting, more power, fuel saving, makes the hills "Fade Away."

Increased Satisfaction, with this unusually satisfactory car.

EASILY PUT ON IN HALF AN HOUR. No change in the car necessary.

Our Guarantee—If you even feel that you can get along without it, return it within 30 days,—money back and no questions asked.

Price—\$15.00. Express prepaid, if cash accompanies the order. Order from us or through your dealer.

Write for booklet giving full information.



The FORD Electric Road Lighting Outfit \$15.00



Not makeshifts, but are complete in every detail, designed and engineered to work in connection with ignition, both deriving their supply of current from the Ford Magneto.

The Outfit complete, which is all you need, consists of

1 pair complete Head Lamps with Parabolic Reflectors with 1 1/2" Focus.

2 Tungsten bulbs, 2 1/16" in diameter.

12 feet wire, cut proper length and soldered to connectors.

1 Diamond Switch. Instruction Sheet for Wiring.

The best results in electric lighting cannot be obtained by the use of reflectors put in gas lamps. The highly burnished silvered surface must be protected in a dust-proof lamp.

The Lamps are made entirely of one piece of brass drawn from steel dies; have no soldered joints, easy to polish, and are 8 in. over all, making a handsome lamp for the Ford cars. They fit the forks furnished on the Ford cars.

The Light which this outfit gives is vastly superior to either a generator or a gas lamp.

The Bulbs have a Tungsten filament of the proper voltage and amperage, which will not interfere with the ignition, and have the Edi Swan or Bayonet base, impossible to fall out and injure the silver reflector like the screw base.

SPECIAL Outfit de Luxe, \$17.00

For those who want something "extra swell" or "classy" for the touring car, we can furnish, if desired, a 9" bullet shaped lamp which also fits the prop furnished on Ford cars.

The 8" lamp is, however, as large as is required to catch all of the rays and throw all of them forward, and a larger lamp than this is merely for looks.

For Black Finishing add \$1.00 to price of either outfit.

HORSEY

THAT'S THE NAME

ONE
MINUTE
REPAIR



USE
GASOLINE
ONLY

No Cement No Acid
Inner Tube Patch

One trial of Horsey No Cement Patches and you will consign Cement and Acid Repair methods to the scrap heap and be dollars ahead by doing it.

Large Kit, box contains 12 assorted (large and small) patches, **\$1.00**.

Small Kit, box contains 8 assorted (small) patches, **50 cents**.

Manufactured exclusively by

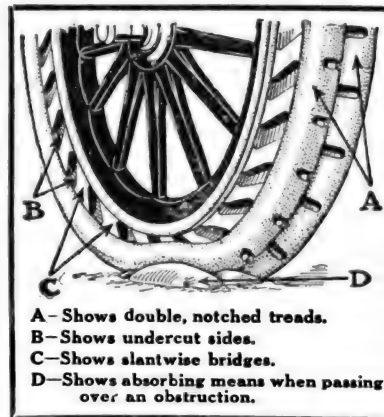
The Horsey Manufacturing Co.

5606 Euclid Ave., Cleveland, O.

Sell this Easy-Riding Tire

That's Trouble-proof

The Motz Cushion Tire is the only easy-riding tire unaffected by punctures or blowouts. That's why 8 times as many sets are in use as a year ago; why 3 times as many dealers are selling them. Nobody who tries Motz Cushion Tires ever goes back to treacherous, expensive pneumatic tires.



Motz Cushion Tires

have double, notched treads, which prevent skidding and distribute the weight to the sides. The undercut sides allow free action of the bridges. The slantwise, elastic bridges give and yield like the air in pneumatic tires.

Each set is guaranteed for 10,000 miles—two years. And four, not five, make a set. No extra tires or repair equipment to carry.

Twenty-two out of a possible twenty-five Electric Pleasure Car builders, as well as nine builders of high grade Commercial Cars, are using Motz Tires.

These tires are easy to apply, because they fit any standard clincher, universal quick detachable or demountable rim.

Write for Booklet 95.

We have a splendid Agency Proposition for live dealers, garage and repair men.

THE MOTZ TIRE & RUBBER CO.

Factories and Executive Offices: AKRON, OHIO.

BRANCHES:

1737 Broadway, New York
999 Woodward Ave., Detroit

2023 Michigan Ave., Chicago
409 E. 15th St., Kansas City

STANDARD TIRE & RUBBER CO., 104-106 Portland St., Boston, Mass.,
Distributors for the New England States.

We also manufacture Demountable Solid and Cushion Tires for Commercial Cars.

HANG ON TO YOUR OLD TIRES
THEY CAN BE USED FOREVER
WHEN COVERED WITH
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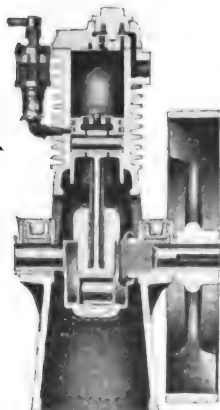
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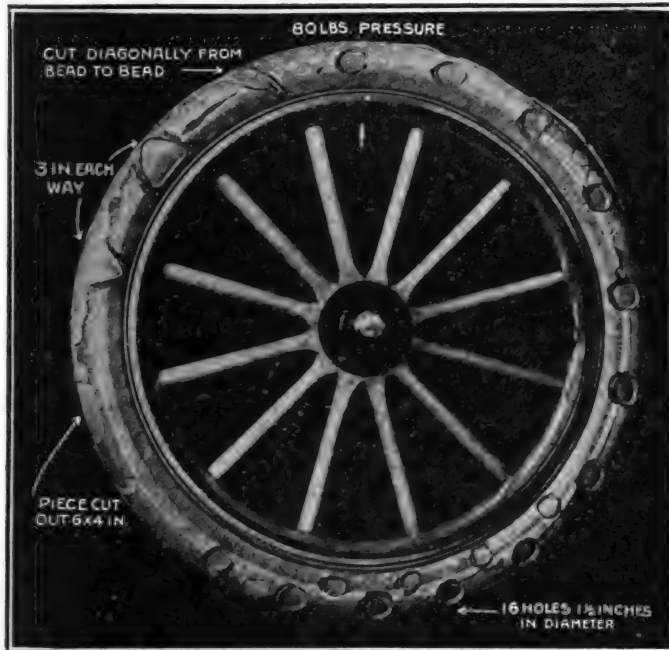
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Why? Interlocks Give Superior Results

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We do our business through Automobile Dealers and Supply Houses, so this special offer is simply to spread the knowledge of INTERLOCK merit, by fitting out someone in each neighborhood who can vouch for the good results of Using Interlocks.

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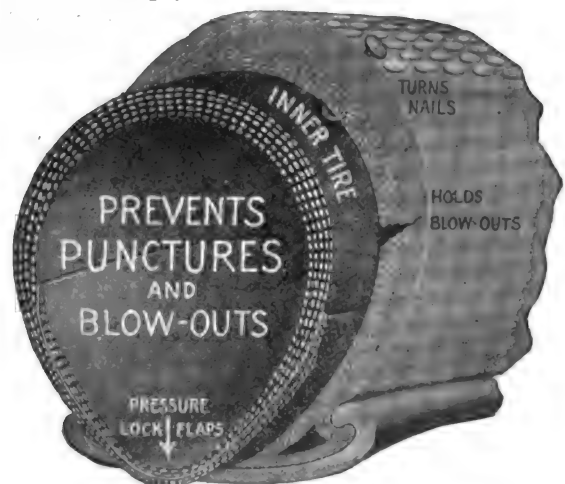
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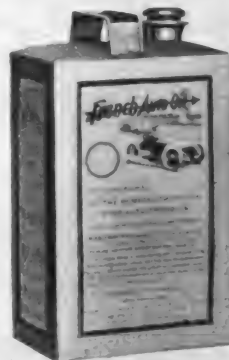
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GUARANTEED ONE YEAR.

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With Monarch Spark Plugs you get a positive guarantee of one year's service or a new spark plug free. They cost no more than the common kind and you get all that is desirable in perfect ignition.

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TABLE OF CONTENTS

	PAGE		PAGE		PAGE
Slide and Poppet Valves.....	33	Vulcanizing	51	For the Side Curtains.....	65
A Broken Ball in the Front Wheel....	36	Water With Crude Oil.....	52	Another Method of Carrying Cur-	65
The Cause of Over-Heating and Loss	36	Jump Spark and Make and Break....	52	tains	65
of Power	36	A Mysterious Knock.....	52	Clutch Pedal	65
Painting Metal Bodies.....	37	No Rear Axle Truss Needed.....	52	For Carrying the Curtains.....	66
Waste of Grease in the Gear Box....	37	Would Be Dangerous.....	53	A Whining Sound	66
Garage Conveniences	38	Clutch Troubles	53	Good for the Hands.....	66
Trouble with the Motor Car Engine....	40	Wiring Methods	53	Grease Working Out of the Differen-	66
Tires and Guarantees.....	41	How He Remedied the Oil Trouble....	53	tial	66
A Knock in the Engine and How It	41	Perhaps Mr. Bowman Will Reply....	53	The Stoddard "20" Push-Rod Knock....	66
Was Cured	41	Noise in 1911 Cadillac Gear Box....	54	Compression in the Buick.....	66
A Wind Deflector.....	42	An Elusive Knock.....	54	Simple Cars and Carbon.....	66
To Make a Tappet Silent.....	42	Two Peculiar Queries.....	55	What Caused the Loss of Power....	66
How Farmers Buy Automobiles.....	42	Lamp and Engine Cleaning.....	55	That Missing Brush	67
Use of Heavy Shears.....	42	Batteries Run Down	55	Grease From the Rear Hub.....	67
Exhaust Valve Cap Trouble.....	42	Compression Pressure	55	The Brush Carburetor Trouble.....	67
A Cure for Leaky Valve Tappets....	43	Carburetor Leaks	55	For the Stuck Pistons.....	67
A Little Wrinkle.....	43	A Leaking Carburetor.....	56	Hot Water for Starting.....	67
A Starting Device.....	43	A Cylinder Misses	56	The Splitdorf Coil	67
Repainting the Car.....	44	Carburetor Connection	56	Starting in Cold Weather.....	68
The Cause of a Sluggish Engine....	46	A Veteran Car User.....	56	Parts for Yale Cars.....	68
A Low Priced Business Looking	46	A Good Ford Car Record.....	56	Will Some One Kindly Reply?.....	68
Truck	46	The Two Cycle Engine Trouble....	56	Estimating for Repairs.....	68
How to Get Good Service.....	46	Automobile Economy	58	Welding Is More Common.....	68
A Quickly Detachable Terminal.....	47	Wire Wheel Advantages.....	58	Neglect By Tire Users.....	68
A Lock for Cars.....	47	Standing In Their Own Light.....	58	Taking Up the End Play of Front	69
Cleaning the Radiator.....	47	Sharper Competition	59	Wheels	69
Handy Pocket for the Door.....	48	Cheap Muscle, Flesh and Bones....	59	To Carry Spare Coats.....	69
Difficulty with an Engine Starting....	48	On a Gallon of Gasoline.....	59	Read the Advertisements.....	69
To Add to the Tire Wear.....	48	Pay of Chauffeurs.....	59	Up-To-Date Models.....	70
Tire Cuts	49	Car Demonstrations	59	Thought It Was the Magneto.....	71
Magneto and Coil Wiring.....	49	The Muffler Cut Out.....	59	Tire Contest Suggested.....	71
Brake Cleaning and Warm Air.....	49	Lessons for Drivers.....	60	An Unusually Fair Statement.....	72
Connecting the Carburetor.....	49	The Lowest Priced Efficient Car	60	Burner Troubles	74
Double Opposed Motors.....	50	Made	60	Steam Car Improvements.....	74
Valve Timing	50	A 142 Inch Wheel Base.....	61	Cure for Steam Car Troubles.....	74
Starting and Polishing.....	51	Shock Absorbers	61	White Steamer Pointers.....	76
Valve Grinding and Carburetor	51	Automobile Lighting	62	Replacements Easily Made.....	76
Troubles	51	The Brush Ignition Trouble.....	65	Filling the Radiator.....	76

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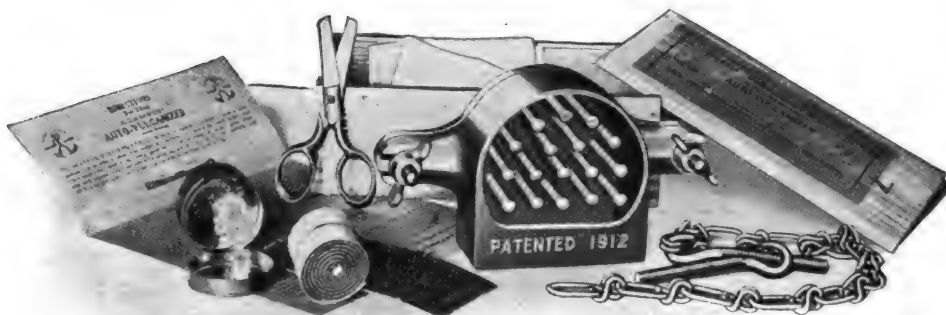
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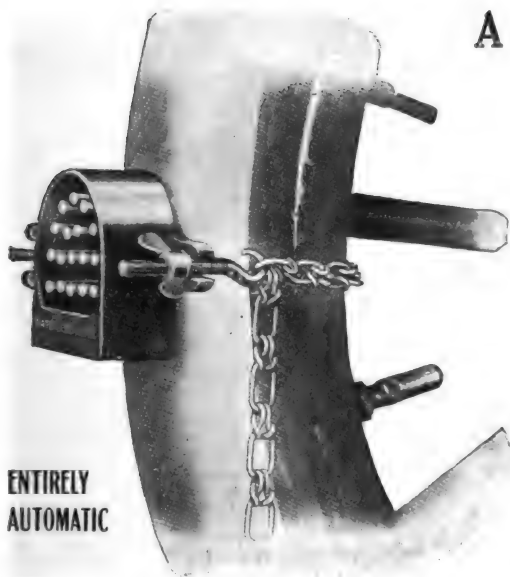
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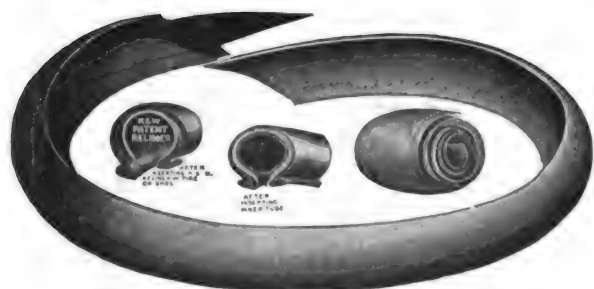
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The "DANDY" Reliner is built wide (so it will reinforce casing at edges) of 3 to 5 plies of heavy rubber duck—(not 2 or 3 of light 8 or 10 oz.). Neatly made. Fits the tire. Heavily CEMENT COATED—ready to insert. SEMI-CURED and very pliable. Made according to the Combined Principles of two U. S. Patents (same as our K & W Patent Reliners or Best Grade)—making the "Dandy" SUPERIOR to other makes.

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PRICE LIST.

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30x3.....3.10	2.90	32x3 1/4.....4.30	3.75	32x4.....5.40	4.00	36x4 1/2.....6.80	4.80
30x3 1/2.....3.40	3.25	34x3 1/4.....4.60	3.85	33x4.....5.60	4.20	34x5.....6.80	4.85
32x3.....3.60	3.30	36x3 1/4.....4.70	4.00	34x4.....5.70	4.80	36x5.....7.00	5.25
32x3 1/2.....3.90	3.50	30x4.....4.90	3.60	36x4.....5.85	4.40		

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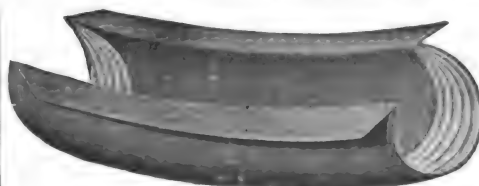
FULL DIRECTIONS for inserting included with each Reliner.

Although the Dandy gives great service and will Revolutionize the Reliner Business, we advise if you want SOMETHING SUPERB "to write us" for description and prices on our K & W Patent Reliners which we have been making for the past three and one-half years and have been asked to replace less than 1/3 of 1%.

K & W "PATENT" RELINERS Are Fully Guaranteed

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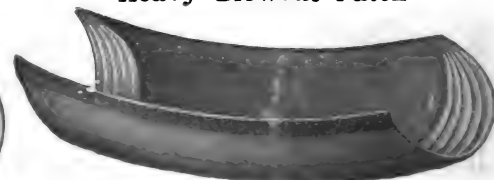
Saves Carrying an Extra Tire. Enables You to "Get Home." Strengthens at Rim as well as on Tread.

This patch is made from 10 to 14 inches long and of from 4 to 6 plies of very heavy fabric. One ply is made wide enough to go under both clinchers. Shaped to fit curve of tire.

Smoothly finished and neatly packed in single carton.

Price Each.	
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3 ".....1.00	4 1/2 ".....1.75
3 1/2 ".....1.25	5 ".....2.00

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This patch should be cemented into the tire over very bad fabric breaks or small blowouts and will make the tire very strong and smooth.

Made of 3 to 5 plies of heavy fabric moulded and shaped to fit the tire.

A High Grade Patch at a Low Price.

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3 "......65	4 1/2 ".....1.20
3 1/2 "......80	5 ".....1.50

This Plaster, made of 5 plies of heavy fabric—3 outside, is uncured. Use it over fabric breaks. Auto size, 7x8 inches. Price, prepaid, 40 cents. Motor Cycle size, 4x5 inches, 3 plies. Price, 25 cents. Packed in Waxed Envelopes.

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K & W MFG. CO., 3rd St., Ashland, Ohio

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A JOURNAL OF PRACTICAL MOTORING

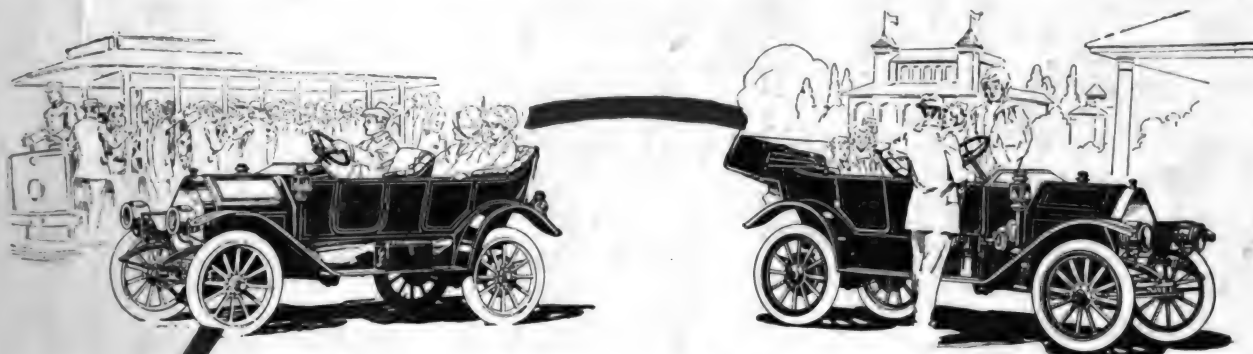
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Vol. 13, No. 3.

NEW YORK, MAY, 1912.

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at all the automobile shows in
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that stood head and shoulders
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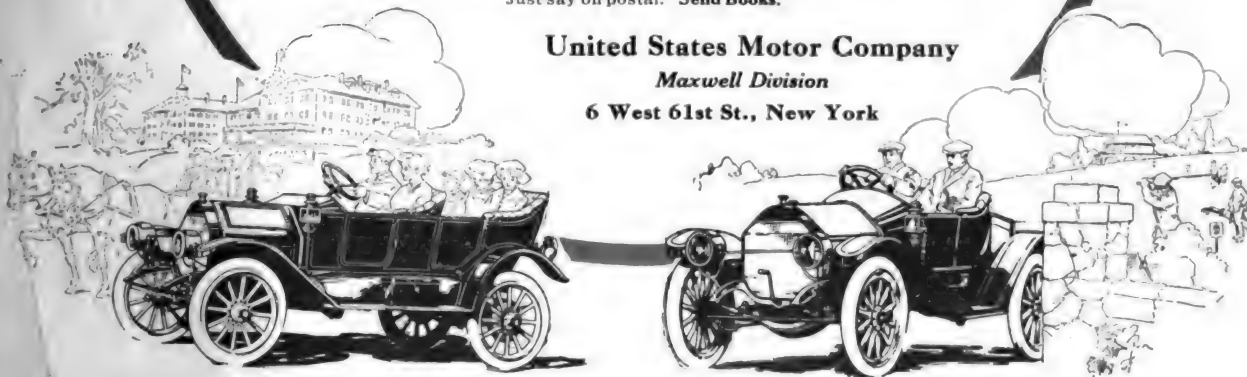
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Maxwell Division

6 West 61st St., New York



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The Table of Contents will be found on Page 120.

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MODEL W-26. Price \$35.00.

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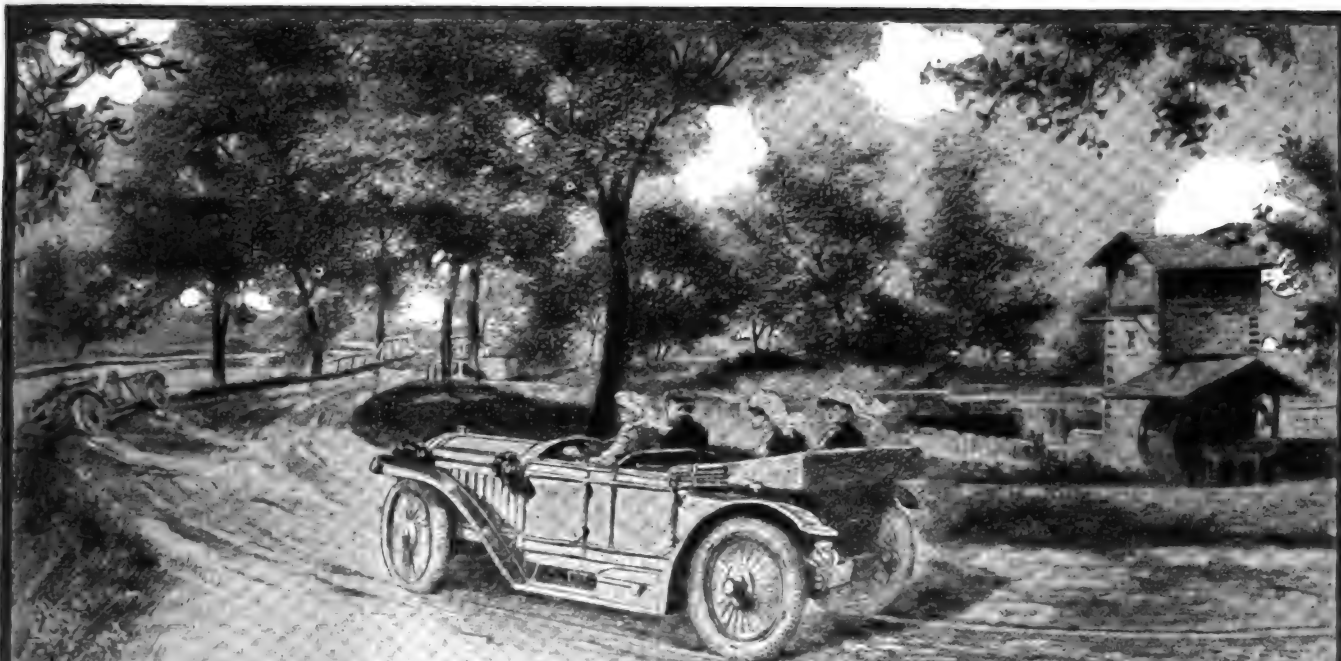
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Avoid Skidding!

No one likes to be a passenger in a car traveling fast on a slippery road, unless the tires have a definite grip.

Chains are a short-lived nuisance. Tires with pattern and stud-ded treads are useful when new, but too costly to be a true solution.

Yet it is possible to avoid skidding without the inconvenience of removing the non-skid device on dry days, and without the expense of special tires. And you can save from $\frac{1}{4}$ to $\frac{1}{2}$ of the mileage cost at the same time, as compared with bare tires.

Woodworth Treads

are an efficient non-skid in wet weather, and a protector against wear in all weathers. Tourists who use them eliminate the tires from their list of worries.

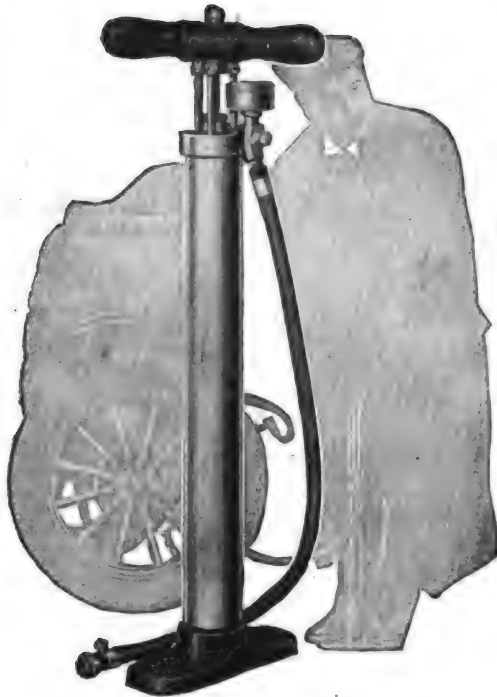
WOODWORTH TREADS have glass-hard steel studs riveted into a soft chrome leather base. Stiff side springs draw the treads always snug on the tires, preventing chafing and heating. Punctures and cuts, together with resultant local rotting of the fabric, are averted. New tires, protected by Woodworth Treads, last about three times as long as when run bare. And repairs of all sorts are practically eliminated.

Write to-day for our useful booklet, "The Preservation of Auto Tires," and further facts about Woodworth Treads. If you mention this magazine we will send a handy leather key ring FREE.

LEATHER TIRE GOODS COMPANY
NIAGARA FALLS, N. Y.



Please mention the Automobile Dealer and Repairer when writing to advertisers.



Made by Bridgeport Brass Co.

It's a pleasure to use
the old, reliable

STAPLEY TIRE PUMP

This powerful, compound pump is the most popular pump on the market. Popular because it—

Inflates tires quickly, without effort, is always ready and always works.

STAPLEY gives complete satisfaction. It pumps a great quantity of air on every stroke. No trouble to inflate tires with a strong, non-leakable pump like this.

Seamless brass tube cylinders. Can't rust. Heavy cast base. Automatic valve-opener—no complicated parts.

You know the reputation of the STAPLEY. Get yours to-day. You'll need it. Above all things don't purchase an ordinary leaky tire pump. Get the best—the STAPLEY. Ask your dealer.


If your dealer doesn't carry it, we will send the STAPLEY prepaid in U. S. on receipt of price.

Without gauge...\$4.00 With gauge....\$6.00

BRIDGEPORT BRASS COMPANY
P. O. Station D, Bridgeport, Conn.

Superior Drop-forgings



There's service in the  trade-marked products and you should have it.

This company originated and developed the means for the best possible care of Nut and Cap Screw-moving conditions and in the selection of "Big-Six" set assure you maximum service in least number of wrenches—capacity for all principal bolts and screws from $\frac{1}{4}$ to 1 inch; for every nut and screw about the chassis or engine.

Circular No. 117 is an interesting one to dealers and owners and a postal card will secure it.

See your dealer or communicate directly if must.

J. H. WILLIAMS & CO.

Superior Drop-Forgings

17 RICHARDS ST., BROOKLYN, N. Y.



Please mention the Automobile Dealer and Repairer when writing to advertisers.



Guaranteed 5,000 Miles Without Puncture

YOUR tire wear costs you from 1½ cents to 4 cents per mile every mile you travel. Hence this season it will be from \$50.00 to \$200.00. This depends upon the size of your tires. If you'll figure for yourself, the result will be more startling.

Saving of Half Guaranteed

We guarantee Durable Treads to save you one-half. That's a fact! We will give you a written guarantee with Durable Treads for 5,000 miles without a puncture.

We will guarantee them not to heat, rot or injure your tire in any way. This guarantee stands whether your tires are new or old, tread-worn, rut-worn, or rim-cut.

Just stop a second! Read these two paragraphs again! Get their full significance!

Durable Treads cost only about half as much as tires. They are made for either Straight-side or Clinch Rims.

Durable Treads are forcing their way to the front, through merit alone. Sales in 1911 increased over 300 per cent. Orders for this season indicate that double that number of car owners have awakened. How are you?

Durable Treads

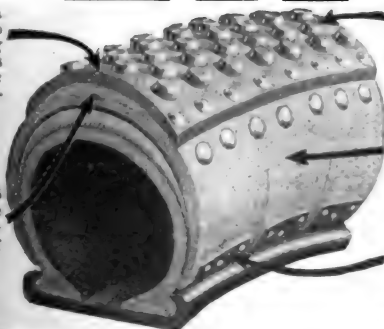
What we MIGHT Do

We might build a protector without Tire Fabric—without extra Tread Strips. We could use only half the Steel Rivets—we could use thin Leather. It would look good on paper—and we could follow modern methods and sell it at the price of our present Durable Treads.

But, we could not give you a guarantee of 5,000 miles without puncture. Durable Treads must be right. If they fail we lose—not you!

What We DO

We use extra Tread Strip to cover wearing surface. This adds 50% to the life of the protector.



We use 3 to 5 plies of Tire Fabric to prevent stretching or sagging.

We use hardened Steel Rivets, closely set on Tread surface, to prevent skidding.

We use Full Leather Cover, which protects Tire from rust and Blow-outs.

Our Nickel Steel Rim attachment places driving strain on wheel, instead of on worn or weakened tire. It prevents rim-cuts and Blow-outs.

Special Offer!

If Durable Treads are not already represented in your vicinity, here is our double offer:

We will ship you a pair or full set for your inspection, without a cent in advance.

We will allow you, on this initial order, our full dealers' discount, and prepay express. This is to introduce Durable Treads in your city. This is an excellent opportunity to make money and to equip your car with the best protector known.

Mail Coupon—Get Facts!

You want to know all about Durable Treads—you want to see our guarantee. So mail the coupon at once, for our interesting booklet: "5,000 Miles Without Puncture." It describes Durable Treads and Durable Blow-out Patches,—it's worth having. So do it now!

Mail This To-day

COLORADO TIRE & LEATHER CO.,
1027 BROADWAY, DENVER, COLORADO.

Dear Sir:—Send me at once, without obligating me, your valuable new booklet: "5,000 Miles Without Puncture."

Name.....

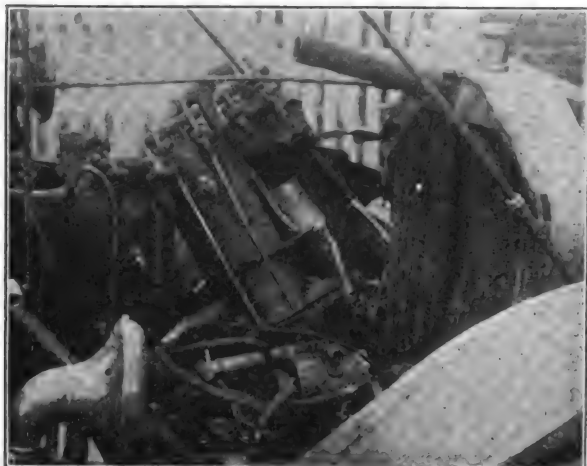
Street Address.....

City..... State.....

Colorado Tire & Leather Co., 1027 Broadway, Denver, Colo.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

Do You Want a Crank Case Explosion?



A great many motors have been destroyed from this cause and so may yours be, if the cylinders have worn large. It is easy enough to forestall the damage and save yourself not only the expense but the obvious danger.

Examine your automobile cylinders in time and if they show wear take them down and send them to us to be rebored.

A car doesn't have to run a million miles before the natural wear causes the cylinders to become larger in diameter, thus allowing the charge to get past the pistons and into the crank case. A spark or a piece of red-hot carbon will ignite the mixture and a crank case explosion blows your motor into fragments. **Before** this happens let us rebore the cylinders. We have special machines for the work and do the reboring as if the cylinders were in their natural working position. We make the bore true, accurate and smooth. New pistons and rings are carefully fitted and our whole process is carried through with the utmost precision and attention to every detail. We guarantee our workmanship to be first-class and you obtain from us all that is possible in mechanical experience and skill.

Don't wait. Send your cylinders NOW.

Eliminate the danger, and at the same time our work will restore to your motor full power and efficiency.

H. B. UNDERWOOD & CO.

1019 Hamilton Street,
PHILADELPHIA, - PA.

TIRES. TUBES. TIRES.

1912 STANDARD MAKES.

FREE SPECIAL OFFER FOR THIS MONTH ONLY.

\$3.00 Button Tire Cover given away with every purchase of tires. These tire covers are guaranteed water-proof and dust-proof and will be furnished in any size.

Highest grade stock, comprising of the best manufacturers. Cannot advertise names on account of the reduced prices we are selling them at.

Every tire is guaranteed brand new, perfect in every respect, and are not more than six months old. Some of these have the names of the makers on and others are buffed.

We thoroughly examine and test every tire and tube under heavy pressure to detect any weakness before shipping.

These are not the kind usually advertised. Nothing but the best stock is quoted in this ad.

Casings to fit Clinchers, Quick Detachable or Dunlop Straight Side Tires.

Size	Casing	Tube	Size	Casing	Tube
28x3	\$9.50	\$2.50	35x4	\$22.00	\$5.25
30x3	10.75	2.75	36x4	19.50	5.40
32x3	10.50	3.00	37x4	23.50	5.75
28x3½	12.00	3.00	32x4½	20.00	5.50
29x3½	14.50	3.15	38x4½	23.00	5.60
30x3½	14.50	3.75	34x4½	23.50	5.75
31x3½	15.00	3.75	35x4½	24.50	6.00
32x3½	15.00	3.90	36x4½	25.00	6.10
34x3½	15.75	4.15	37x4½	25.00	6.20
36x3½	15.00	4.25	34x5	20.00	6.00
30x4	16.50	4.60	35x5	25.50	6.25
31x4	17.00	4.75	36x5	26.00	6.50
32x4	17.50	4.90	37x5	28.00	6.75
33x4	19.00	5.00	37x5½	30.00	7.00
34x4	19.50	5.10			

Take advantage of these prices and free offer, as we cannot guarantee how long these prices will stand good.

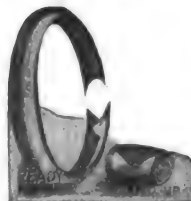
We guarantee these tires and tubes to be strictly 1911 and 1912 goods.

We are one of the oldest and largest tire mail order houses in the United States, and you do not have to hesitate to send us an order with cash accompanied, as we can refer you to any Commercial Agency or Bank in New York, as to our references.

We agree to refund your money if goods are found unsatisfactory upon receipt.

We Ship Goods Subject to Examination.

INSIDE TIRE PROTECTORS.



Prevent blow-outs, punctures, and greatly increase mileage. These tire protectors are made from 8 to 6 ply of Egyptian fabric, with a self-seal flap reinforcing the rim and sides, always the weakest parts. Tube pinches are eliminated by the use of these protectors.

Order a complete set of them and save 100% on your tire expense.

Size	Reg. Price	Cut Price	Size	Reg. Price	Cut Price
28x2½	\$4.65	\$2.40	35x4	\$7.00	\$4.90
28x3	4.75	2.60	36x4	7.75	5.00
30x3	4.90	2.85	32x4½	7.25	5.00
30x3½	5.25	3.35	34x4½	7.50	5.10
32x3½	5.50	3.55	35x4½	7.60	5.25
34x3½	5.75	3.95	36x4½	8.00	5.50
30x4	6.20	3.75	34x5	8.10	5.60
31x4	6.25	4.00	35x5	8.25	5.75
32x4	6.40	4.20	36x5	8.50	6.00
33x4	6.60	4.40	37x5	9.00	6.50
34x4	6.75	4.75	37x5½	9.25	6.75

Owing to the fact that our profits are very small, we sell for cash only, and under no circumstances otherwise.

C. O. D. orders filled if 10% is accompanied with order, to show good faith.

Send for complete list.

EXCELSIOR TIRE CO.,

1777 Broadway,

New York City, N. Y.



The Road-Proof Varnish

The mud filled with ammonia, the road oil, the "sand blast," have always soon destroyed any varnish ever put on a car until this year.

There is now a remedy.

VANADIUM CHASSIS FINISHING

withstands all these deadly enemies of varnish.

It also defies soapy water, the varnish destroyer in the garage. It is the only varnish that does.

The hoods, fenders and all the underparts of the car retain their fresh, handsome appearance five to ten times as long when finished with this varnish as with any other ever made.

Mr. Car Owner: Request that Vanadium Chassis Finishing be used on your car. It will stay new looking for many months longer.

Mr. Auto Painter: Use Vanadium Chassis Finishing—every car finished with it will send some other car to your shop.

Mr. Car Manufacturer: There is no other one small item of extra cost that will do so much to make your car popular as will a permanent finish with Vanadium Chassis Finishing.

One quart of Vanadium Chassis Finishing costing \$1.25 is enough for a medium sized car. It will outwear \$5.00 worth of any other varnish—not to mention the extra cost of doing the job three or four times with anything else.

Send \$1.25 for a trial new finish for a car.

Valentine & Company

456 Fourth Ave., New York

343 S. Dearborn St., Chicago

74 Pearl St., Boston

TRADE **VALENTINES** MARK

There are cheaper oils than Panhard, Mr. Dealer, but you cannot buy a better oil.

You cannot sell an oil that will give your customers more satisfaction.

Panhard Oil sells **itself** the second time. Its high quality and uniform goodness—forces reorders.

**PANHARD
OIL**

Panhard Oil is refined from the best oil in the world—Pennsylvania Crude. It holds its body at high temperature and will not carbonize unless fed too freely.

Panhard Oil is widely advertised in National magazines and trade papers.

Almost every automobile owner in the country knows of Panhard Oil. With your co-operation he will buy it. **And** he'll come back for more. Panhard Oil assures you a profitable oil trade by building up a steady, permanent demand.

Stock Panhard Oil. Hang up Panhard signs. Reap the benefits that are sure to come your way.

Let us tell you our special co-operative plan to dealers.

George A. Haws
67 Pine Street New York City

Distributing Stations:

Boston; Chicago; San Francisco; Omaha;
Columbus, O.; Minneapolis; Salt Lake City;
St. Louis; Shreveport; Los Angeles;
Spokane; Portland, Ore.



"HELLO BILL! What have you got in the can?"

"A real automobile soap,

'BUCKEYE CLEANSER.'"

"H-m-m-m, pretty good stuff, is it?"

"You bet! It keeps the machine looking as good as new. I've been using it ever since it's been on the market, and the beauty of it is that it's not only good for the car, but anything else that needs cleaning. The maids up at the house use it for cleaning the woodwork, piano and the rest of the furniture."

"Gee! I'll have to tell the boss about it, maybe he'll get a can of it."

"I'll tell you what you do. Write to the J. P. DAVIES COMPANY for a **free sample**. They'll send you enough to wash your car two or three times. Then you can show the boss just what it will do."

"Thanks! I'll do that."

"Don't let them wash your car with anything but 'BUCKEYE CLEANSER' at the garage. Tell them you won't stand for a cheap soap being used on your car."

"That's a good idea, and I'll write for that **free sample** to-day, sure."

THE J. P. DAVIES COMPANY
DAYTON - - OHIO

"BUCKEYE CLEANSER" is sold by dealers, jobbers and garages everywhere.



**Insist on this
Label**

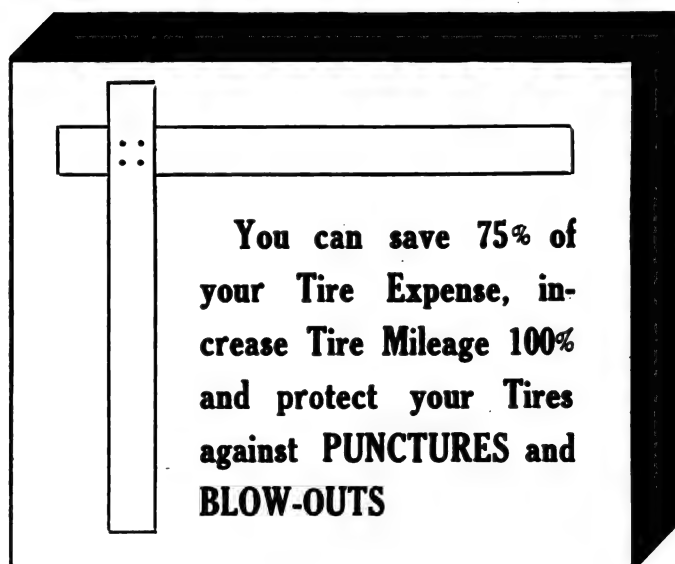
THE "INNERSHU"



**It is found on
Every "Innershu"**



**A 100% Increase in Tire Efficiency
GUARANTEED**



**We will ship DIRECT IF not represented in
your territory**

INNER SHOE TIRE CO., Grand Rapids, Michigan

TURNTABLE EXCELLENCE

Is obtained only by using a "UNIVERSAL" Auto Turntable in your garage—a size for every car and purpose—one for *you*.

"UNIVERSALS" can always be relied upon to give maximum Turntable satisfaction.

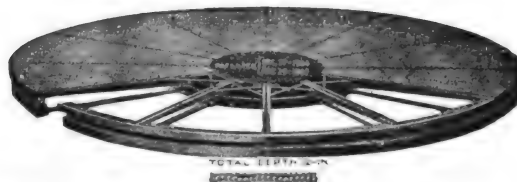
So easy to turn that a child can operate.

The Construction of "UNIVERSALS" is the simplest—and most durable of all Automobile Turntables.

If you want your Garage—public or private—to be thoroughly up-to-date, it will pay you to order your "UNIVERSAL."

This is the Turntable Everyone is Talking About

Time Tried and Tested.



Affords Protection.
Saves Time and Money.



CONCRETE—ANY DEPTH AND GROOVED TO WATER DRAIN

Write to-day for Catalog "C-1" and prices to

THE CANTON FOUNDRY & MACHINE COMPANY, Canton, Ohio

Don't Throw Away Your Worn-Out Annular Ball Bearings

Have them **Reground** and made as good as new.



We also carry a complete line of S.R.B. Annular and Thrust Bearings in stock, and can fit you up no matter what your bearing troubles are.

Prices Quoted on Application

AHLBERG BEARING CO.

2632 Michigan Ave., CHICAGO, ILL.

Revolving Cases.

OUR NEW CASE.



Square Drawers, from $2\frac{1}{4} \times 8\frac{1}{2} \times 4\frac{1}{2}$ to $5\frac{1}{2} \times 5 \times 13\frac{1}{2}$.

No manufacturer, dealer or repairer of Automobiles should be without our Cases. They occupy but a small space and their capacity is very large. The Drawers are locked in the Case so as to prevent their removal. Every Case guaranteed. Made for Screws, Bolts, and other small articles. Made in various sizes.

Catalog sent on application.

AMERICAN BOLT & SCREW CASE CO.,

Dayton, Ohio.

Please mention the Automobile Dealer and Repairer when writing to advertisers.



What is "Good" Motor Car Service?

Whether or not your car gives good service depends entirely on what your standard of good service is.

If you are contented with using your car only about six or eight months of the year—and only over the best roads you can find—then probably you would be satisfied with most any car on the market today.

But if you want a car that is always ready for you—in winter and summer—a car that you can drive anywhere you may have a desire to go—then you will have to be mighty careful in the car you choose.

Getting right down to brass tacks—a car must stand three things to be capable of giving good service. These are sand, mud, and hills. If all roads were paved with asphalt any car would answer the purpose—but until that time comes there will only be a very few cars that can possibly give really "good" service.

First, your car must have the minimum waste power. The more complicated the construction the more waste power, always. Your car must be simple and strongly made to stand the strain that is sure to come. And it must be easily operated so that there will be no possibility of causing trouble through some mistake on the driver's part.

Of course, you can readily see that a car which has these features will be more efficient on good roads.

The Cartercar has practically no waste power. This is because of the patented Friction Transmission, which has only two unit parts. This is also the simplest transmission possible. There is absolutely nothing about it to cause trouble.

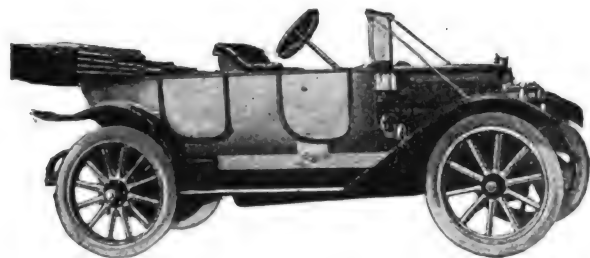
This transmission affords you any number of speeds. At the lowest speed the ratio is so great that the Cartercar will easily climb a 50% grade. This same power will take the car through very bad sand and mud.

And it is remarkably easy to operate, too. You have this unlimited number of speeds with a one lever control. There are also three independent systems of brakes, making the Cartercar safe and delightful for ladies to drive.

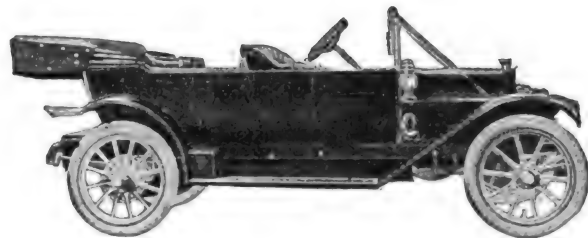
The Cartercar is adapted for use on both crowded city streets and country roads—giving perfect service wherever you wish to drive.

Five splendid models, ranging in price from \$1200 to \$2100. This includes complete equipment, Self Starter, top, top cover, windshield, speedometer, gas tank, five lamps, robe rail, trunk rack, tonneau mat, demountable rims, tools, tire repair outfit, etc.

If you want a car for service—real service—then you will be interested in the Cartercar, the car without gears.



A big classy Roadster, equipped



Seven passenger, equipped, \$2100

Write us for catalog and any information you wish.

We'll tell you where you can secure a demonstration.

Cartercar Company,
PONTIAC, MICHIGAN

BRANCHES: New York, Detroit, Chicago and Kansas City.

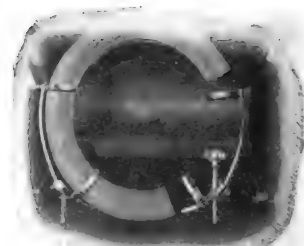
Please mention the Automobile Dealer and Repairer when writing to advertisers.

PATENTED FEB. 27, 1912.

Badger Running Board
Tire Holder

Badger Wind Shields

PATENT APPLIED FOR

Badger Rear End Demountable
Rim and Tire Holders

AUTO PARTS MFG. CO.

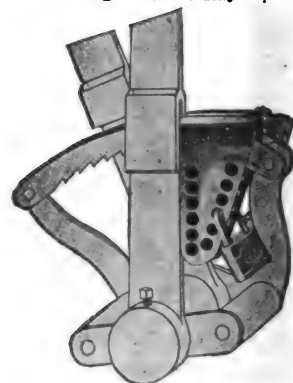
(Badger Accessories)

Patent was granted on our Badger Running Board Demountable Rim and Tire Holder Feb. 27th, 1912, by the United States Patent Office. All persons are cautioned against using or selling infringed Badger Tire Holders, as there is a liability.

Badger Ford Bumper



Badger Lock Clamp



AUTO PARTS MFG. CO.

161-171 Michigan St., Milwaukee, Wis., U. S. A.

SEND FOR CATALOGUE

HORSEY

THAT'S THE NAME

ONE
MINUTE
REPAIR.USE
GASOLINE
ONLY

No Cement No Acid
Inner Tube Patch

One trial of Horsey No Cement Patches and you will consign Cement and Acid Repair methods to the scrap heap and be dollars ahead by doing it.

Large Kit, box contains 12 assorted (large and small) patches, **\$1.00**.

Small Kit, box contains 8 assorted (small) patches, **50 cents**.

Manufactured exclusively by

The Horsey Manufacturing Co.

5606 Euclid Ave., Cleveland, O.

A NEW TIRE FOR \$1.25



**"It's Tough and Elastic"
and "Stays Put"**

Repairs punctures in tubes.
" casings where the carcass is exposed.
" cuts in casings
" sand pockets.
" blowouts.

For the Cement-Doh Outfit contains one large Blowout Patch, 1 can Doh, 1 can of M. & M. Cement, emery cloth for cleaning, brushes and complete directions.

Repairs will be permanent and you can do it quicker and better than vulcanizing. No heat required—no possible chance of burning your tube or casing.

Ask any Tire Manufacturer if the Cement-Doh process isn't recommended by them.

COMPLETE OUTFIT, \$1.25

Not \$2.00 nor \$2.50.

Sold by all dealers and jobbers or sent direct express prepaid.

THE M. & M. MFG. CO., Akron, Ohio.

Manufacturers of that famous M. & M. Cement—all goods sold on the money back plan.

A POSTAL WILL BRING OUR NEW CATALOGUE.

By looking over your tires once a week and filling up those curb cuts which are left unprotected so that sand—and water—cannot work through the opening, loosen the tread and rot the fabric—causing blowouts.

Cement-Doh prevents all this, and saves the cost of a new tire.

Cement-Doh makes all kinds of repairs, such as:

Please mention the Automobile Dealer and Repairer when writing to advertisers.



Time: 3 A. M.
Scene: 20 Miles from Nowhere)
Trouble: Everything
Lost: Sleep! \$80! One girl!
Monolog: G'r'r'r!!

Tire Misery Must Go! Get Protection Pleasure

GET rid of tire misery *now*. You can't afford to delay using these tire protectors. You can't afford it from either a money-losing or pleasure-losing standpoint. And now you never need endure another of those costly tire troubles, not even the least of them. They are all ended. For here is a tire protection that protects. Protects against puncture, blowout, stone cut or bruise, chafing, and all the other forms of wear and tear. Think of riding on one set of tires for more than two years' constant travel, over good roads and bad, without a single tire trouble. Thousands of motorists who have found that Standard Tire Protectors keep tires uninjured, sound and good as new long after the longest lifetime of unprotected tires, are getting the pleasures and making the savings that you can get and save with

Standard Tire Protectors

No freakish filler or leather tread! The toughest rubber ever produced—a new rubber—is used exclusively in Standard Tire Protectors for 1912. With layers of fabric that will stop nails, glass and all other tire dangers—this new and toughest rubber makes Standard Tire Protectors almost like armor plate around, over and outside your tire. All disappointing "retreading" unnecessary longer!

save you cost of missing trains, failing to meet business appointments on time, getting to the theatre when the play is half over,—they save you the costs of delay at all those times when delay means agony.

Skidding protection is combined with tire protection—the economy of double protection at just one single cost—by our famous non-skid tread, which may be had instead of plain tread if desired.

Lower Prices This Year

are the result of our new manufacturing facilities. On all the popular sizes, fully 20 per cent reduction from 1911 prices removes the least reason for you to hesitate. Standard Tire Protectors would be an economy at several times the prices you will pay for them. They

FREE Book on Tire Protection

You will find it full of valuable information and convincing proof that your tires need no longer be the bane of your motoring pleasures. Write for this free book today.



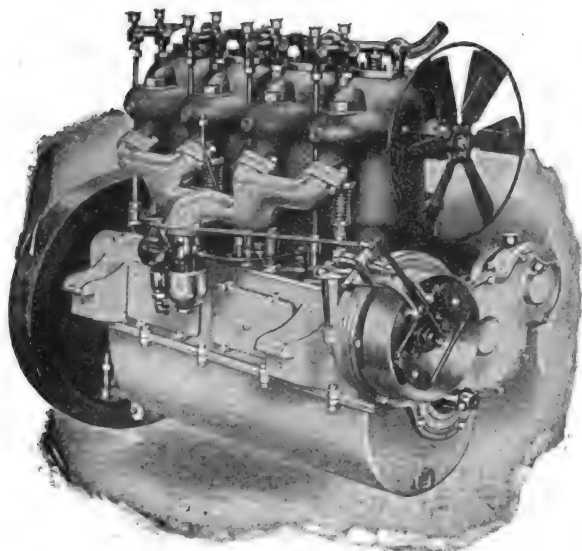
Ask
the
Man
Who
Uses
Them



The Standard Tire Protector Co.,
 550 E. Market St., Akron, Ohio

Dealers:—20 per cent average reduction to consumers and new scale of larger discounts to dealers, make Standard Tire Protectors one of your best-paying lines of auto accessories. You know that your last year's sales of Standard Tire Protectors would have been more than doubled had it not been for that troublesome price question. It is now solved. Our 1912 prices to consumers are far lower, dealer's discounts higher and the product far better than ever. The advance orders prove we shall sell five times as many Standard Tire Protectors in 1912 as we sold in 1911. You want to get your share of this increasing business. We are advertising nationally—reaching all motor car users. They will expect to get Standard Tire Protectors from you. Write us for new prices, terms and particulars of co-operation offered.

Please mention the Automobile Dealer and Repairer when writing to advertisers.



No. 11.—Single cylinder, stationary engines, 2 to 125 H. P.

That we furnish engines for farm tractors, railway locomotives and commercial vehicles of all kinds, is evidence of the range of our work and the stability of our construction.

Model Gas Engine Works

Lock Box 2002, PERU, IND.

OUR LINE IS COMPLETE.

WRITE for the following catalogs of the line in which you are interested:

No. 18.—General construction of all motors from $3\frac{1}{2} \times 4\frac{1}{2}$ to 5x6, cone clutches and transmissions.

No. 20.—30 to 40 H. P. unit power plants with 4 forward speed transmissions and governor.

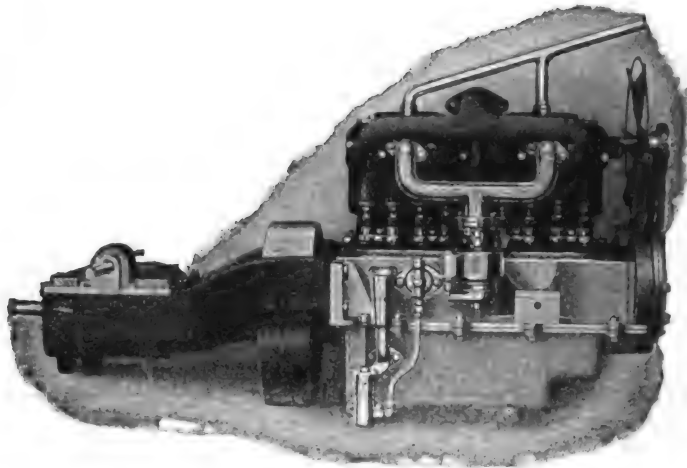
No. 21.—22 H. P. unit power plants with 3 forward speed transmissions.

No. 19.—Wells clutch.

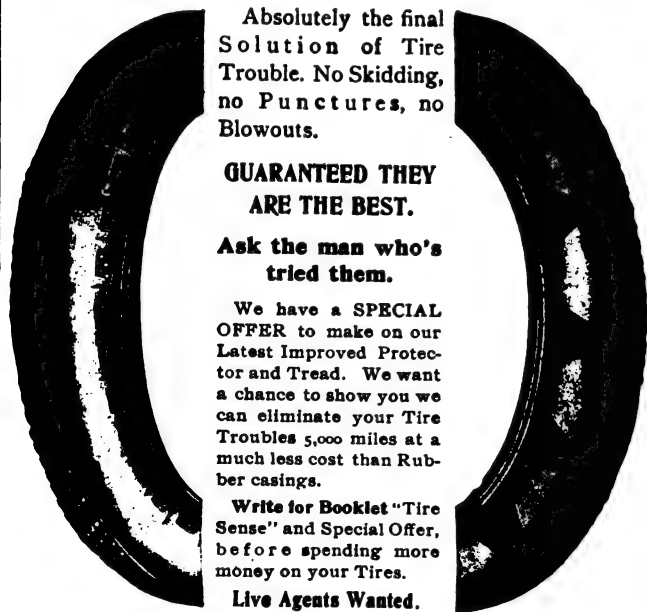
No. 17.—4 cylinder, marine engines, 12 to 500 H. P.

No. 16.—4 cylinder, stationary engines, 12 to 500 H. P.

No. 15.—4 cylinder, stationary engines (suction gas type), 25 to 500 H. P.



OUR MODELS 1912 Latest Improved Protector and Tread



Absolutely the final Solution of Tire Trouble. No Skidding, no Punctures, no Blowouts.

GUARANTEED THEY ARE THE BEST.

Ask the man who's tried them.

We have a SPECIAL OFFER to make on our Latest Improved Protector and Tread. We want a chance to show you we can eliminate your Tire Troubles 5,000 miles at a much less cost than Rubber casings.

Write for Booklet "Tire Sense" and Special Offer, before spending more money on your Tires.

Live Agents Wanted.

20th Century Tire Protector Co.

Main office and factory, MIDLOTHIAN, TEXAS

Dallas Office, Pacific & Olive Streets, Dallas, Texas

AMERICAN Re-Enforced Inner Tubes



"THE TUBE THAT MAKES THE TIRE"

TIRES are strengthened on the tread; we strengthen the base or "Tread" of the tube. (See Cut.)

Eliminates all bead pinching; adds 100% to life of tube.

Sole manufacturers of 5 MINUTE CURE VULCANIZING CEMENT.

Manufacturers of Tire Protectors, Cementless Patches and a complete line of Repair Materials.

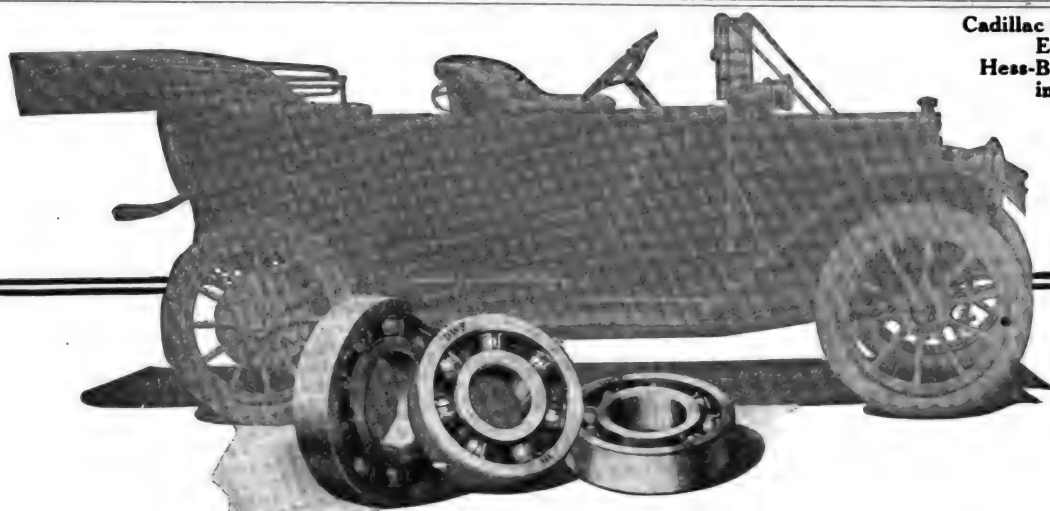
"Everything for the repair man."

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Cadillac fore-door touring car
Equipped with
Hess-Bright ball bearings
in transmission

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The selection of the correct design is only the first step in the making of a genuinely durable ball bearing.

The softer the steels used, the lighter will be the loads they can safely carry. The points of contact in a ball bearing are slightly flattened by compression. So small are these load carrying areas, however, that extreme density and hardness are essential.

Steels that could be hardened sufficiently for the requirements of serious commercial ball bearing service were unknown until somewhat recently. It is the development of modern alloy steels, as much as laboratory research in the matter of design, that has made possible the phenomenal endurance of the best modern annular ball bearings.

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The theory and principle of ball bearings are covered fully in the Hess-Bright Catalog. Specific applications, methods of mounting, etc., are described in the Hess-Bright Data Sheets. These sheets are kept up to date by frequent revision. Both Catalog and Data Sheets will be sent to any engineer on request. Write on the stationery of your Company.

**THE HESS-BRIGHT
MANUFACTURING CO.**

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Keystone Tire & Rubber Co.

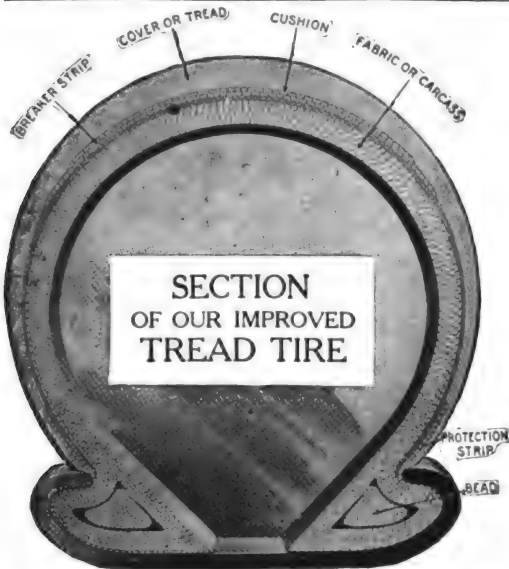
Every Tire Guaranteed

We have decided to open the Season by supplying the Consumer at Dealers' Prices with our
1912 GUARANTEED TIRES AND TUBES

These reduced prices are for new, fresh stock, guaranteed free from any imperfections.

SALES OFFICES
1732-1734 Broadway NEW YORK

*Buy Direct from the
Manufacturer and Save the
Dealers' Profit.*



Prices subject to change without notice.

REDUCED PRICES

Sizes	Clinchers	Straight Side	Tubes
28x3	\$10.20	\$10.65	\$2.90
30x3	10.95	11.50	3.05
32x3	11.45		3.35
30x3 1/2	15.80	16.70	4.15
31x3 1/2	16.45		4.30
32x3 1/2	16.90	17.20	4.45
34x3 1/2	17.20	17.90	4.60
36x3 1/2	17.70		4.80
30x4	21.27	21.95	5.25
31x4	21.90	22.70	5.45
32x4	22.45	23.70	5.60
33x4	23.45	24.70	5.75
34x4	24.45	25.70	5.90
35x4	24.90	25.90	6.00
36x4	25.45	26.20	6.15
34x4 1/2	28.90	29.70	6.65
35x4 1/2	29.70	30.95	6.90
36x4 1/2	29.90	31.70	7.15
37x4 1/2	31.70		7.45
35x5	34.45		7.90
36x5	35.70	36.70	8.30
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In ordering state whether Clinchers, Quick detachable Clinchers or Straight Side Dunlop.

In order to secure these reduced prices, it is necessary to order at once. We think it will be greatly to your interest to purchase a few of these tires, as an advance in prices is anticipated.

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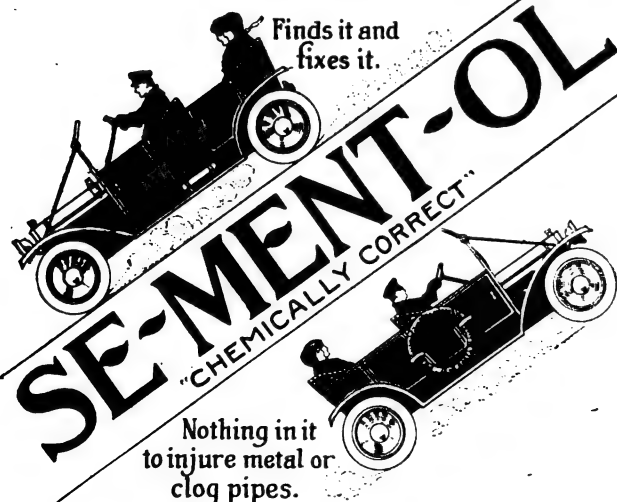
We pay transportation charges on all orders accompanied by Check or Money Order East of the Mississippi.

No goods sent C. O. D. unless order is accompanied by 10% of the amount of purchase.

References: Sherman National Bank, New York City, R. G. Dun & Bradstreets.

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Up hill or down dale, always ready for
a radiator leak.

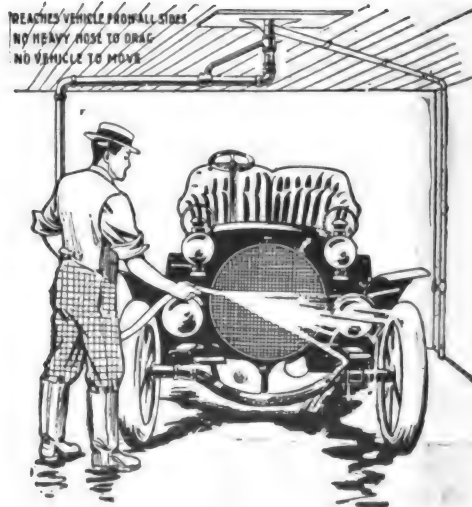


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Price 75¢

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It saves time, labor and money. It keeps the hose off the floor.
It drains both ways. It is made of malleable and wrought iron.
It is sold on honor and guaranteed.

THEREFORE, your hose keeps dry and never wears out. No kinks.
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The time to decide is now—

*Will you secure inexpensive,
pleasurable mileage, or—
“just tires”?*

“Goodrich Service” is no abstract phrase. It means, first of all, **GOOD WILL** service—and a square deal to all. It is backed up by the greatest organization ever provided to keep in touch with and care for the tire user’s wants.

“Goodrich Service” is neither new, patentable nor sensational; it is as old as

GOODRICH TIRES

MADE OF REAL RUBBER

The Original American Clincher

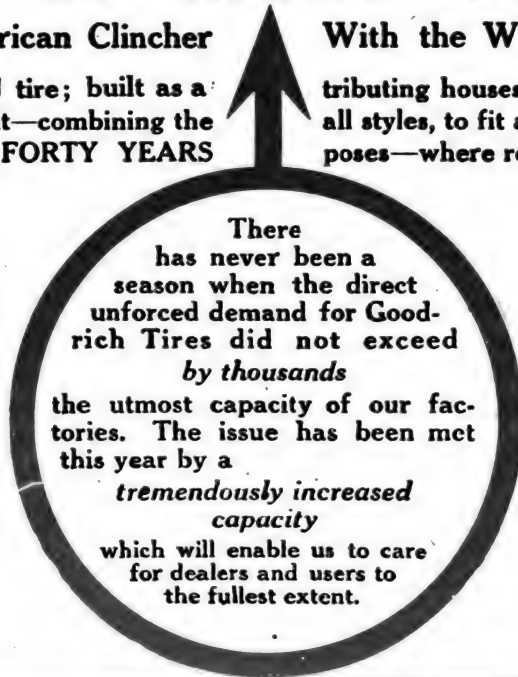
The integrally molded tire; built as a unit and cured as a unit—combining the qualities which only **FORTY YEARS** of rubber manufacturing experience could produce.

One hundred branches and service stations take care of the tire user after sale. A complete system of dis-

With the White Tough Tread

tributing houses—supplied with tires in all styles, to fit all rims, to suit all purposes—where replacements are always convenient and adjustments always satisfactory to the tire user.

Will you buy “just tires,” or partake of **Goodrich Service**—in both pleasure and mileage a proven quantity.



THE
B. F. GOODRICH CO.
AKRON, OHIO
Largest in the world.

MAKE MONEY REPAIRING TIRES

BOLTLESS TIRE KETTLES



CASING REPAIR VULCANIZERS
AIR COMPRESSORS and TANKS
STEAM BOILERS
INSIDE PATCH VULCANIZERS
TUBE REPAIR VULCANIZERS
POT HEATERS and STEAM VULCANIZERS
COIL SPRINGS FOR RETREADING
RETREADING MOLDS
ROTARY RASPS
WIRE BRUSHES, Etc., Etc.

The Boltless, Quick Opening Tire Kettle and other devices shown in our New 1912 Catalogue insure best results from the smallest investment.

With this kettle you can cure a retread as easily as a sectional repair. **There is not a single bolt to tighten.**

Give your customers quick service by curing retreads as fast as they are built up.

You can make money repairing tires either as part of a garage and general repair business or as a separate venture. Requires very little capital to equip a shop completely with the best tire repairing outfit in the world. The equipment can be paid for and a good profit made by the first season's work. Every motorist must have tires repaired—every motorist in your vicinity is a possible customer for tire repairing.

Get the right kind of equipment—one that produces work that you can guarantee—the Akron-Williams Tire Repair Equipment which was designed by practical tire factory repairman.

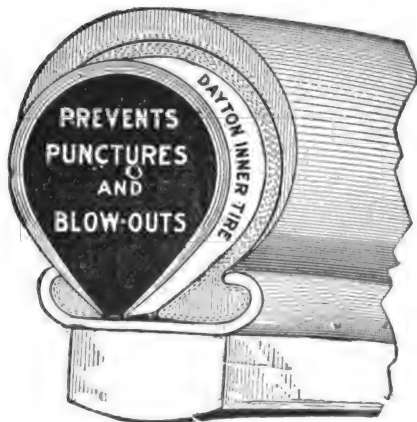
Localized heat is the secret of the Akron-Williams. Three separate steam chambers in each of our sections, our exclusive patented feature, limit the curing process to the repaired part.

Proof that the Akron-Williams is the best is the fact that the big tire manufacturers use it—Firestone, Goodyear, Diamond, Republic, Pennsylvania, Revere, Hartford, Consolidated, Empire, Manhattan, Shawmut and many other tire manufacturers are among our customers. They know by experience what is most practical. We can equip a tire repairing plant of any desired capacity. Don't delay getting into this profitable business.

Get into correspondence with us to-day.

THE WILLIAMS FOUNDRY & MACHINE CO., Glendale Avenue, Akron, Ohio

TIRE TROUBLE STOPPED



Wear the tread completely off your tires by using the

Dayton Inner Tires

ABSOLUTELY prevents BLOW-OUTS and 90% of PUNCTURES.

Prevents tube pinches from fabric breaks.

Easily inserted and can be changed from OLD to NEW casings.

Write (Right now) for Descriptive Catalog.
AGENTS WANTED.

Dayton Inner Tire & Mfg. Co.,
DAYTON, OHIO, 19 Madison.

IDEAL

Lawn Mower Grinder

Grinds all makes of mowers perfectly in 15 minutes, without removing wheels, ratchets or reel knife. Operated by either hand or power. Ball bearing Alundum Grinding Wheel and Main Shaft. New 1912 Model will grind straight-blade without removing from mower. Has Skate Sharpener Attachment for sharpening skates.

WRITE TODAY for full information of this great labor-saver and money-maker. Will do the work so much better, quicker and easier, you cannot afford to do without it. Write today. Don't delay.

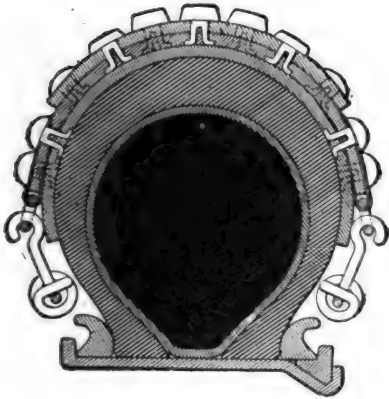
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Sold on easy payment terms.
Over 5000 in use.

THE HEATH FOUNDRY & MFG. CO.
PLYMOUTH OHIO

"You Grind It as You Find It."

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The A. S. B. Triple Leather Tire Protector.



THE A. S. B. Treads are made of 3 thicknesses of leather from the best imported hides. It is Chrome Tanned in the U. S. and is guaranteed to us. It is ten times tougher than rubber. A ten-penny nail will bend before it will go through it. It is next to impossible to puncture it. Our leather is waterproofed. It will not get hard nor crack after being exposed to water or snow. These Treads are all full-steel-studded, with hard steel studs in the center. The side rivets are of a softer steel to better prevent skidding.

Our Treads are self-adjusting, as our springs on the sides of the Tread are made of No. 10 gauge steel wire of the very best and are $\frac{5}{8}$ of an inch in diameter. This makes a perfect, strong spring and keeps the Tread tight on the tire at all times. The springs are much nearer the center of the wheel than the face of the Tread. This gives them greater leverage, or rather tension, and is bound to keep them tight. These springs never lose their spring quality as they are made of the right diameter for a No. 10 gauge premier steel wire. They allow flexibility. That relieves the tires of practically all side strain and eventually prevents blow-outs, for the side strain is what wears and breaks the side-walls of the casing and causes blow-outs. These springs keep the Tread on straight and tight. They do not slip and crawl on the tire and destroy the power of your car at times when your power is most needed. We feel safe in saying the A. S. B. Treads are the only self-adjusting non-creep Treads made.

Our Guarantee! We guarantee the A. S. B. Treads to not heat, chafe, rot or injure your tires in any way. If they are not everything we claim them to be, you can return them at the end of 10 days' trial and we will refund your money. The A. S. B. Treads are not an experiment. They have been tested out for the past two seasons. They are giving universal satisfaction and are doing the business. As they do not slip and crawl on the tire we are safe in backing up every A. S. B. Tread that leaves our works with the above Guarantee.

They will more than double the life of your tires and will do away with at least 95 per cent of your tire troubles and that means cutting your tire up-keep expense to a minimum. We Guarantee 4000 miles wear without puncture. Some of the drivers abuse their Treads the same as they would their tires and we are obliged to place the mileage that low, but with decent usage under ordinary conditions they will give from 8 to 10 thousand miles wear. That depends entirely on the condition of the roads traveled and on the manner in which the driver handles the car.

The side-openings prevent the sides from puckering or pocketing. They will not pick up dirt nor sand. They aid in cooling the tire. By an actual test it was proved that tires equipped with A. S. B. Treads run several degrees cooler than the naked tires.

We want an Agency in every town in the U. S. If there is no Agent in your territory, we will make you a Special Price on a full set of four in order to get them on a car where all the Car Owners can see just what we they are. The Treads will get the Repeat Orders, and that is what we are after.

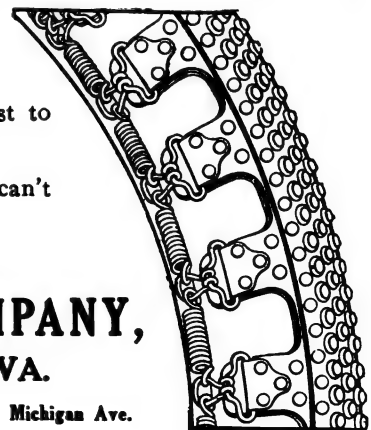
If you are tired of paying excessive tire bills, it will be to your interest to write us for prices, terms, etc.

If you are a Dealer, we have a proposition to offer you that you can't afford to pass up.

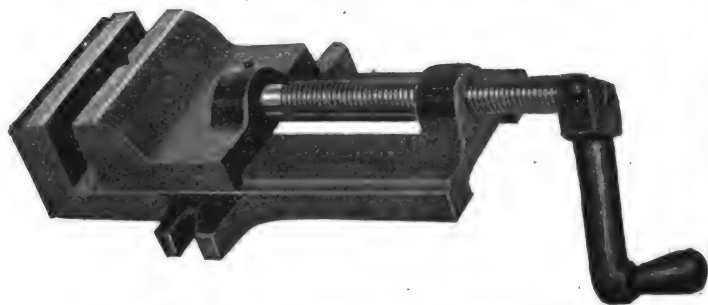
Our References—Any Bank in our City.

Factory Address **QUEEN MANUFACTURING COMPANY,**
Lock Box 224, WEBSTER CITY, IOWA.

Agencies—Dallas, Texas, c/o Box 616. Cincinnati, Ohio, 77 Perin Bldg. Chicago Branch, 1346 Michigan Ave.
Address all B. & L. Caster Front Automobile Axle enquiries to our Chicago Office.



Drill Press and Milling Machine Vise



4½ inch Jaw, 1¾ inches deep, opens 4½ inches

MADE OF CAST IRON AND STEEL
SCREW

\$3.50 F. O. B. Our Works
WEIGHT 15 POUNDS

*Mr. Dealer and Repairman, you cannot afford to be
without this Vise.*

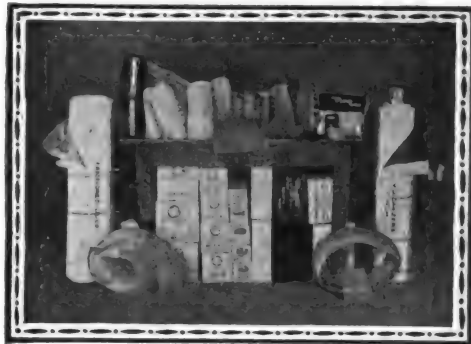
SEND US YOUR ORDER AT ONCE.

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621-23 CHERRY STREET PHILADELPHIA, PA.

VOORHEES "IDEAL" AUTOMOBILE RUBBER SPECIALTIES

TO SAVE EXPENSE AND
AVOID TIRE TROUBLES



VOORHEES RUBBER MFG. CO.

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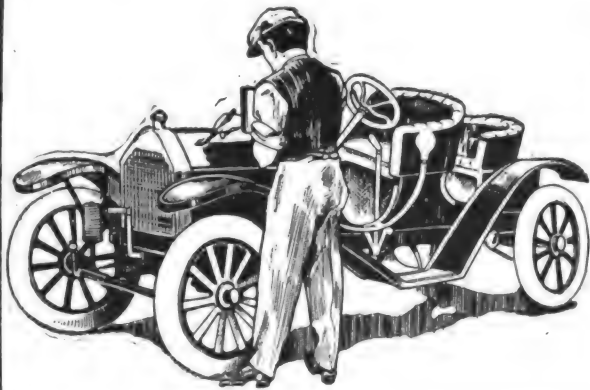
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MANUFACTURERS OF

Automobile Accessories, Repair Stocks, Etc.

Ask nearest dealer or write to us direct.



Paint Your Car Yourself!!

The STYLE for 1912 is BLACK ENAMELED HOODS and FENDERS REGARDLESS OF THE BODY COLOR OF THE CAR. AND ENAMELED LAMPS in place of polished brass as in the past. Our booklet "THE CAR BEAUTIFUL," tells how you, yourself, can entirely repaint your car at home at a small expense, or enamel your hood and fenders only, or enamel the lamps, or revarnish the car, or repaint the chassis—in fact it tells all there is to know about the home painting of motor cars. Send for it to-day. It is FREE.

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ROCK ISLAND, ILL.

SPECIALISTS FOR MOTORISTS

Empire Tires

WEAR LONGEST

EMPIRE TIRE CO., Trenton, N. J.

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What Does Service Like This Mean to You

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AUTOMOBILES FOR PACIFIC COAST
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JULIUS THRESHING MACHINE CO.
CAL.-B. HOME OFFICE AND FACTORY, RAGONE, WIS.
NEW YORK BRANCH, 1800 BROADWAY
C. A. LEWELLEN, BRANCH HOUSE MANAGER

New York, N. Y., March 27, 1912.

Remy Electric Co.,
1806 Broadway,
City.

Gentlemen:-

It affords us pleasure to testify to the efficiency of your service department. Your evidently increased desire to see that the Remy magneto gives satisfaction to customers, backed by your ready support in ever-soon complaints, and making adjustments cannot fail to rapidly establish the Remy magneto in the confidence of most manufacturers and owners of automobiles.

Yours truly,

C. A. Lewellen
Branch House Manager.

Remy Electric Company,
Anderson, Ind.
Gentlemen:-

We write this letter to express our appreciation of Remy service generally. The fact that your Company has established service stations throughout the country certainly should be appreciated by manufacturers, dealers and users.

Yours very truly,
HOWARD AUTOMOBILE COMPANY.
Per *H. Howard*

Dio. P. S. R./N. A. P.

Did you ever hear of Ignition Service before the Remy Electric Company created it?

Are you taking advantage of this Remy Service, making it a valuable part of your complete car service?

Let us tell you more about the The Best Magneto and Real Magneto Service.

Factories and General Offices at Anderson, Ind.

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AUTOMOBILE TIRES

We are the largest dealers in the world.

Write for our "Price Wrecker," quoting guaranteed and unguaranteed tires.

We have a special dealers' proposition and an offer for agents.

Popular, well-known makes as follows:

28x3	\$5.00	31x4	\$11.25
30x3	5.50	32x4	11.50
30x3 1/2	8.00	33x4	11.75
32x3 1/2	8.50	34x4	12.25
34x3 1/2	9.00	36x4	12.50
36x3 1/2	9.50	34x4 1/2	12.75
30x4	10.75	36x4 1/2	13.25

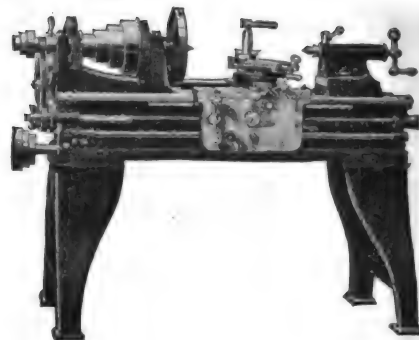
Tubes, Windshields, Lamps, etc., all at Jobbers' prices.

TIMES SQUARE AUTO CO.,

1708-1718 Broadway, New York City.

Also { 1332-4 Michigan Avenue, Chicago, Ill.
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SEBASTIAN 15-INCH LATHE



The LOW-PRICE, PERFECT-QUALITY lathe for the GARAGE and GENERAL REPAIR SHOP.

If you are in the market for a lathe be sure and investigate the merits of the SEBASTIAN.

CATALOG mailed free on request

THE SEBASTIAN LATHE CO.

108-110 Culvert Street, Cincinnati, Ohio

LOOK—PREPAID



Adamantine Screw Plates

Cutting 1x72, 2x56, 3x48, 6x32, 8x32 inches, - - - -	\$2.25
" 10x24, 12x24, 14x20, 3/16x24, 7/32x1/4x20 inches, - -	2.25
" 1/16x72, 3/32x56, 1/8x40, 5/32, 3/16x24, 1/4x20 inches, -	2.25
" 2x56, 4x32, 6x32, 8x32, 10x24, 12x24 inches, - - -	2.25

Send for Catalogue of Threading Tools

AMERICAN TAP & DIE CO., Greenfield, Mass.

AIR ALWAYS ON TAP

ALL YOU WANT—AT RIGHT PRESSURE—NO WAITING

CURTIS COMMON SENSE GARAGE PUMP

← WILL LAST A LIFE TIME →

For Stationary or Portable Service—Belted Direct to Motor or Line Shaft—Will Furnish All the Air Ordinarily Required About a Garage—or Air for Your Sprinkler and Water Supply Systems.

CONSTRUCTION DETAILS

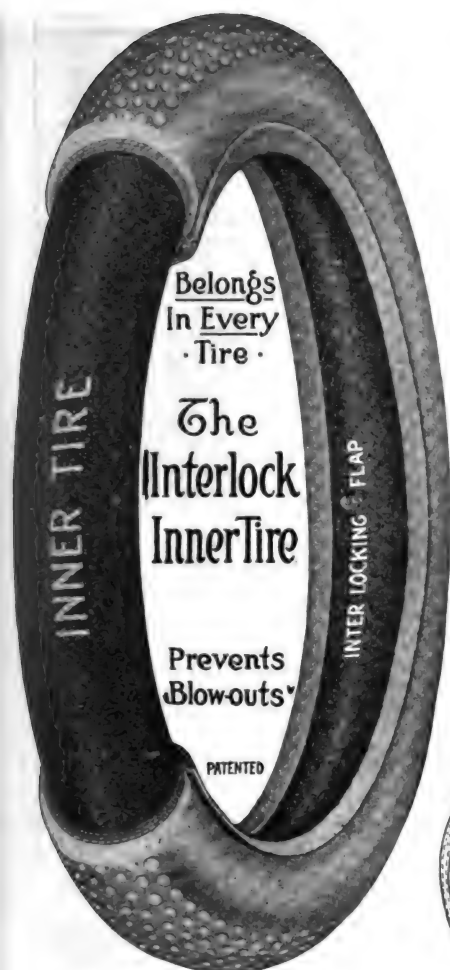
Vertical up-plunger type—will not carry oil over into the tires. Fewest possible number of parts, hence less friction, less power required, less oil and fewer adjustments. Fan shaped fly-wheel arms direct a cyclone of air on cylinder radiation flanges. Springless intake valve in the piston head that insures prompt valve action.

WRITE US TO-DAY FOR PARTICULARS AND PRICES.

CURTIS & CO. MFG. CO., 1530 Kienlen St., St. Louis, Mo.



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WHY INTERLOCK INNER TIRES



ARE Much *Superior* to All Ordinary or *Open Edge* "Inner Shoes" or "Reliners." ¶ Being originators and manufacturers of all types, we are free to explain the difference clearly.



These Further Points Are Equally Vital

POINT ONE—Interlocks *look* and *are* like a tire, being full round and made to fit the inside of the tire perfectly. Easily and quickly placed in any tire. No bothersome cementing of the edges.

POINT TWO—Interlocks have no open joint to curl up and no edges to pull down along the bead. In fact it *protects* the tube against rim pinches. By a new process the tread adjusts itself to the slight size variations in different makes of tires.

POINT THREE—Interlocks cannot creep because positively locked to the rim by pressure on the patented overlapping flaps. This *lock* at the bead, together with the tread cement makes the Interlock *flex perfectly with the tire*. This feature is of vital importance since it effectually prevents any chafing or heat. It cannot be obtained in any other reinforcement.

There's Quality Too

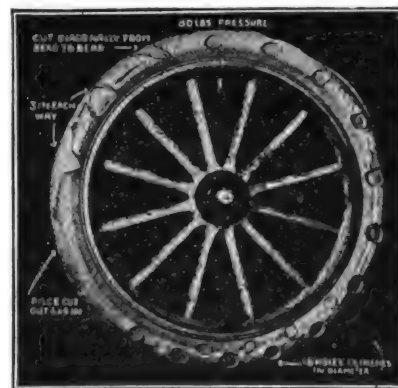
GOOD FRICTION—full Laminated Fabric—one more ply than usual—Smooth Finish inside and out; *but if it wasn't good, we wouldn't back it*. The fact that we do, tells more than a dictionary full of details—for back of the Interlock is 7 years experience, as originators and manufacturers of tire reinforcements.

WRITE FOR OUR SPECIAL PROPOSITION

DOUBLE FABRIC TIRE CO.

18 East Ninth Street, AUBURN, INDIANA

Please mention the Automobile Dealer and Repairer when writing to advertisers.



THIS Photo Proves a holding power impossible with anything but an **Interlock**, which is here holding 80 lbs. pressure in a tire completely cut away in over 20 places.

BULLS EYE SPARK PLUG

"The Plug with the Crystal Ports"



Shows at a glance dead cylinders and imperfect combustion.

Aside from special features the best made spark plug on the market.

Ports guaranteed against breakage.

Order a set from your dealer or from us. \$1.25 each, charges prepaid on receipt of price.

G. C. BLICKENS DERFER CO.
STAMFORD, CONN.

Enjoy Complete

Electric Lighting Luxury

With Berdon Guaranteed System

The Berdon System of electric lighting for motor cars and motor boats offers complete lighting efficiency under all conditions. The current output automatically increases as the lamps are turned on, and is decreased when the lamps are not in use.

You can drive a car as fast or as far as you like and it will not affect the efficiency of this perfect **Berdon Electric Lighting System**. It is mechanically perfected so that it can be easily installed by an average mechanic.

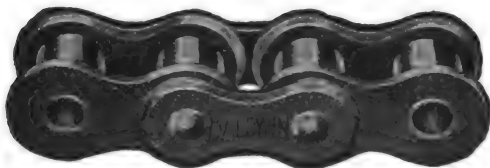
It is manufactured by a responsible company, which has been the leader in building electrical apparatus for more than ten years. A Berdon System is **guaranteed for the life of a car**.

Berdon Electric Lighting is best for car owners, dealers and manufacturers. Our guarantee insures efficiency, and our unlimited factory capacity guarantees prompt delivery.

Send for the complete literature explaining the Berdon Electric Lighting System. Sent free to any address.

THE ESTERLINE COMPANY

Engineers and Manufacturers
110 Main Street
Lafayette, Indiana



Baldwin Chain and Mfg. Co.

makes automobile chains both riveted and detachable—
all sizes in stock.

SPROCKETS

We carry in stock sprockets for the following cars: Cadillac, Reo, Buick, Brush, and Chase Motor Truck. Sprockets made to order.



Send for Quotations and Circulars

Baldwin Chain & Mfg. Co., Worcester, Mass.

AGENTS: { Mr. H. V. Greenwood, 150 Michigan Ave., Chicago, Ill.
Mr. C. J. Iven, Rochester, N. Y.
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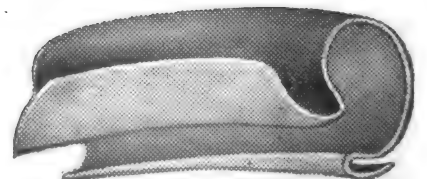
An OUTSIDE and INSIDE EMERGENCY PATCH

sold under an iron-clad GUARANTEE to refund your money if you are not completely pleased after TRIAL. Standard size, 8 in., \$2.00. Prepaid to any address.

Money refunded and express paid both ways if you are not satisfied.

Good proposition to offer LIVE DEALERS.

Write for Illustrated Catalog.



20TH CENTURY TIRE PROTECTOR CO.,

Main Office and Factory, MIDLOTHIAN, TEXAS
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Branch Offices: Chicago, Ill.; San Antonio, Texas; Pittsburg, Pa.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

That Tire Question

Would soon cease to be so annoying, once you make yourself acquainted with the **Triple Tread** method of eliminating your punctures, preventing your car from skidding, and doubling your tire mileage.



"BEFORE"

The strength and resilience of a tire is in its heavy fabric carcass. Rubber treads are only to furnish a wearing surface to protect this carcass, and to keep out its greatest enemy—water.

Chrome leather, reinforced by steel studs, is the only thing tough enough, water proof and pliable enough to make a better and more economical tire tread than rubber. Chrome leather is ten times tougher than rubber, and water proof.

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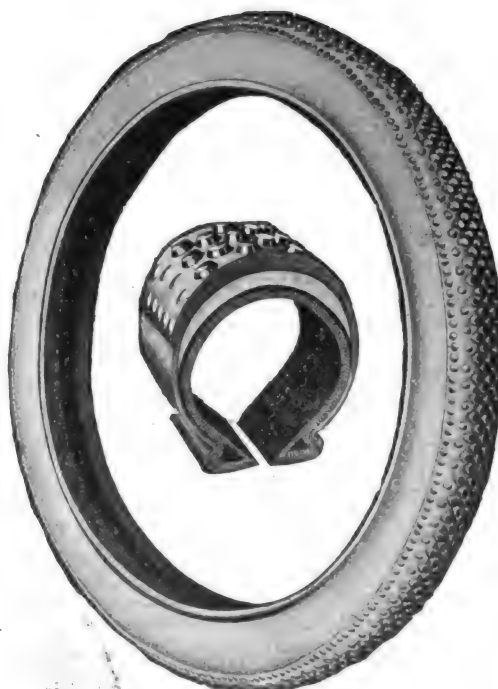
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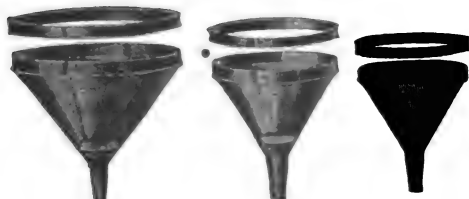
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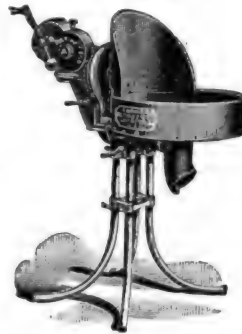


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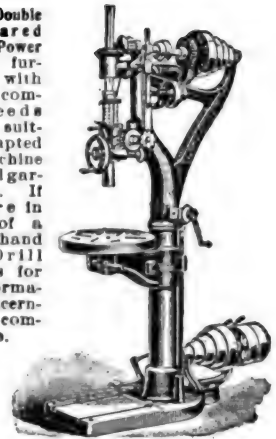


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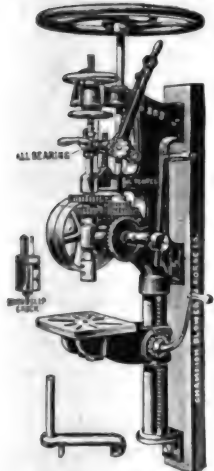


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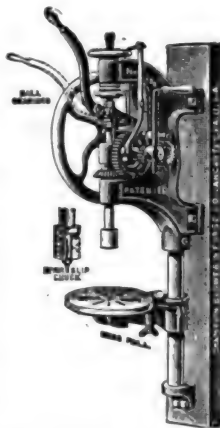


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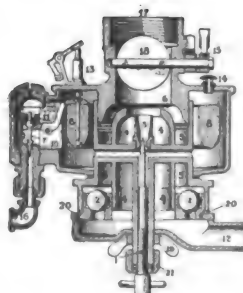
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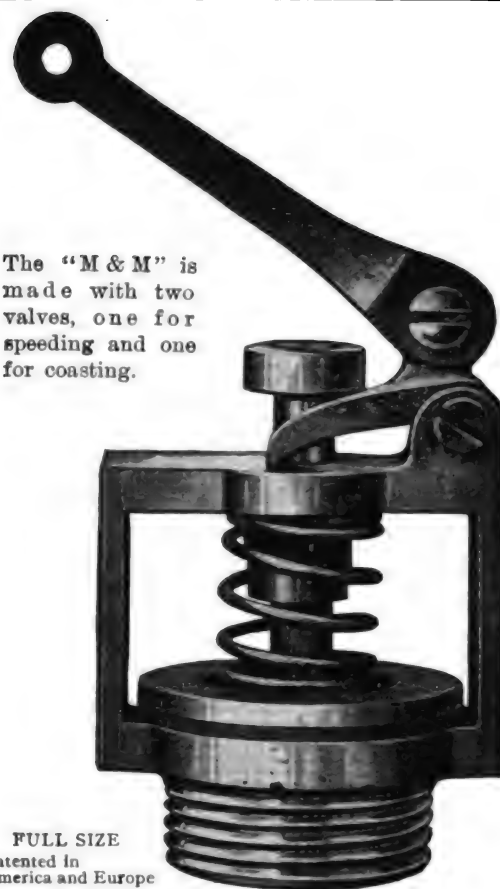
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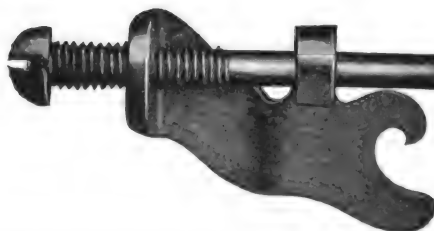
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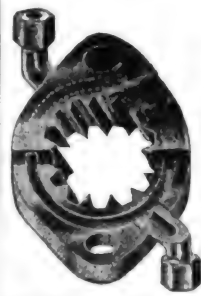
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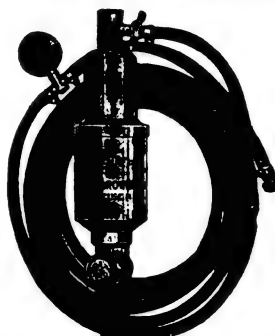
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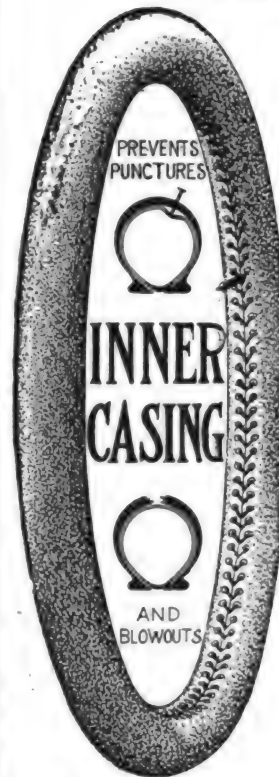
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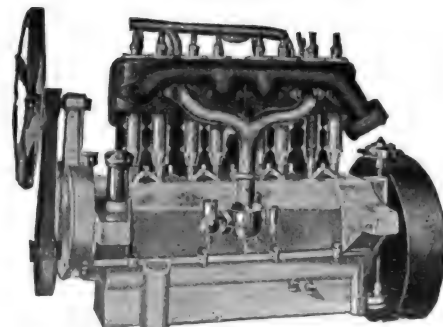


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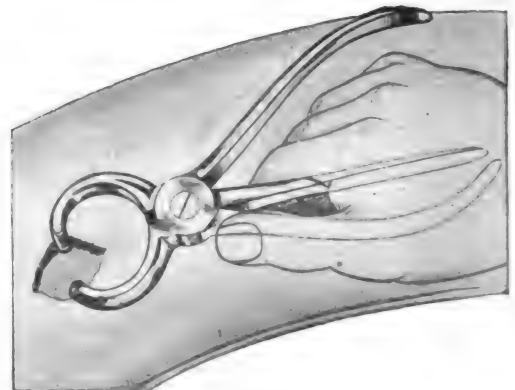
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SLIDE AND POPPET VALVES.

Mr. Walker Sums Up and He Seems To Do So Fairly and Intelligently.

BY SYDNEY F. WALKER.

The struggle between the poppet valve and the slide valve, illustrates once more the old question, whether it is better to have some apparatus which is very well fitted, usually very expensive, and which is likely to break down, only at very rare intervals, but which when it does break down, is very difficult to repair; or to have an apparatus which is more likely to require repair, but which can more easily be got at for repair. The answer to this question depends upon the answer to other questions, of course. Where the car is used for town work only, and in the large cities of America—New York, Chicago, St. Louis, etc.—or in the large cities of Europe—London, Paris, Berlin, etc.—where repairs can always be done quickly, and where there will not be much difficulty under the very worst conditions, of sending the car to the repairing shop, and getting a substitute meanwhile, the slide valve engine and all it represents, should undoubtedly be the best. Where the car is used more in country places, especially in the sparsely populated districts, it is probable that wisdom will lie in using the poppet valve. In the large cities, substitutes are always obtainable. In these days any one whose car breaks down, can leave it in charge of his chauffeur, jump into a hired car, and reach his destination. In country districts the same thing does not hold; repair shops are comparatively few and far between, and the wise owner will depend more upon repairs that his chauffeur can carry out, than upon sending the car to the repairing shop.

The Question of Power.

As indicated in the beginning of this article, there is another important question in connection with the rivalry of the two valves, viz., the power required to drive them. This question of the power required to move the valves of all engines, is one that is very often lost sight of. In steam work, the steam turbine has one enormous advantage over triple and quadruple expansion reciprocating engines, in that it has only one valve, or at most two, and that its valve has not to be constantly in motion; while with the reciprocating engine, every cylinder has its own valve, which has to be moved at every stroke. In the case of the poppet valve and the slide valve, it is a question of the power required to lift the different valves at every fourth stroke as against the power required to keep the sleeves or other arrangement forming the valves of the slide valve, constantly in motion. It will be remembered that with the poppet valve, the inlet valves are only opened once in every four strokes, and the exhaust valve is only opened once in every four strokes, with the four cycle engine. With the slide valve, the slides are kept constantly moving over the surfaces of the cylinder. The writer believes that no actual measurements have been taken, none so far as

he is aware have been published, giving the power required in each case. It is a difficult matter to isolate the power required to work valves in these cases, and particularly in the case of the slide valve. So much depends too upon the construction both of poppet and slide valves. The stronger the spring which brings the poppet valve back into its place, the greater is the effort which the engine must exert in lifting it. Again the heavier the valve itself is, the greater is the effort the engine exerts in lifting it. As is well known, poppet valves vary very considerably in themselves, though a certain rough standard of manufacture has established itself. Some makers like a fairly heavy valve, assisted by a moderate spring; others like a moderately light valve, assisted by a fairly strong spring; and the range of difference between them is considerable. The question of the size of the engine also will come in, and the number of strokes, and the power required will necessarily vary with them.

On the other hand, while with very careful fitting, and with careful lubrication, the power required to move the sleeves over the surfaces of the cylinders should not be great, if any slips have been made in the fitting; if any but the right kind of lubricating oil is employed; if there is anything to give rise even to a small amount of friction, the power required with the slide valve may be very considerable. With the old steam slide valve, one of the troubles that arose during the later period of its reign was the power that was required to move it with comparatively high steam pressure, owing to the pressure of the steam behind the valve forcing it up against the face of the cylinder. In the gasoline engine, there will be nothing equivalent to this, so far as can be foreseen; but there may arise another cause for pressure between the sleeves and the cylinder walls, viz., expansion of the sleeves, or expansion of the piston rings, forcing the sleeve up against the cylinder walls. This again is, of course, a question of workmanship in the first place, and of care in replacing the piston rings later, and of care in choosing the proper kind of piston rings. It may happen, however, that the piston rings have to be replaced in some town where the best form cannot be obtained, and where perhaps the rings have to be made specially, and out of metal which expands more than the metal of which the proper rings are made, the result being the exertion of a pressure and the setting up of friction. Incidentally it may be asked whether while so much power is absorbed in the gearing of all motor cars, the question of a little power more or less in the movement of the valves is of much consequence, providing that noise is eliminated and the car works continuously.

Working of the Slide Valve Engine.

After all the most important question is, how does the engine work. As mentioned in the earlier part of the article, the original slide valve engine introduced into England by Mr. Knight, came over from America, but has been imitated more or less by other makers. Of course, the patent rights of the Knight engine prevent

actual copying; but there are always a number of ways of performing any particular operation, and once a particular method is shown to be good there are a number of followers. In engineering work there is unfortunately too much in the nature of fashion. Too many engineers are as ready to follow the fashion set by some bold pioneer, who has struck out a new line for himself, and has been successful, as there are women ready to follow a leader of fashion in dress. In too many cases engineers do not stay to consider whether the example set is applicable to the particular work they have in hand, just as half the women who follow a fashion, do not stay to consider whether it suits their style or not. In the case of the slide valve motor car engine, as far as it has gone, it can hardly be said that the attempts which have been made to do the same thing in another way, are due to fashion, in the same sense that engineers sometimes copy, irrespective of the applicability of the new departure. Still fashion rules in commercial matters, and particularly in such a thing as motor cars. The fact that a motor car fitted in a particular way runs well, without noise, and without annoyance of any kind, tends to turn the sales of motor cars to the firm making that particular kind; and in self-defence makers of other motor cars are obliged to produce something that will do the same work in practically the same way. Hence in England, at any rate, they have had the rotating slide valve introduced by the Argyll Company of Scotland in which it will be noted the Corliss valve is partly copied, and the piston valve introduced by another firm. As mentioned above, the piston valve is a close imitation of the old steam piston valve, and is designed to perform the work done by the slide valve in the Knight engine, in another way and without what presumably are genuinely supposed to be possible sources of failure in the Knight. The Argyll rotary sleeve engine has only been on the market for a short time in England, and therefore it is rather early to judge its performance. The Darracq and the Itala Company, both have rotary slide valve engines. Each also of recent introduction.

The Knight engine has been on the market for three years, and there is time for reports to have been obtained as to its working. So far all reports are very satisfactory indeed. The engine works well, quite silently, except under certain conditions: is stated to be very economical, to give no trouble in the matter of repairs, and to be generally a good machine. It is not silent after all if it is overdriven. Its usual speed is 1,000 revolutions per minute, but it has been driven up to very much higher speeds, and when the speed passes a certain critical figure, noise commences.

One very peculiar feature that is reported in connection with the Knight engine is, that it runs best when it is "dirty." The writer takes this to mean, that it runs best when it has settled down to its work, when all parts have been working together for a certain time, and when so to speak, they know each other. Every engineer is familiar with the fact that all machinery works better after it has been in use for a certain time. Shafts which run in bearings, are purposely made a little tight, and they run sweetly, without heat, providing they are properly lubricated, when they have been running a sufficient time to "bed." According to the reports, there have been no troubles such as have been pointed out as possible in the earlier part of this article. There have been no troubles with carbonizing of oil between the sleeve and the cylinder, or in the ports; there has been no trouble with wear of the sleeve or the cylinder. All this points, however, to the fact that great care has been taken by the makers of the engine in England, the Daim-

ler Company, in following out the points mentioned above. The metal must have been very carefully selected, from which both cylinders and sleeves were made. It must have been careful, reliable and thoroughly skillful tools that handled it, and the men who handled the machine tools, must have been very careful and very high class men; and above all, the men who were responsible for passing the different parts, and for assembling them, must have been careful, reliable and thoroughly skillful. Further, the lubricating oil with which the engine has been worked must have been good.

It will be very interesting to see how the rotating slide valves compare with the Knight valve. The rotating slide valve has one advantage claimed for it above the Knight; it has one cylinder instead of two sleeves. One disadvantage pointed out by a mechanical engineer in connection with this arrangement is, the twisting action to which the rods moving the rotating cylinders will be subject. As the rotating action takes place so very frequently, unless the rod; and every part of the apparatus engaged in the twisting action, are carefully proportioned, are made of thoroughly good material, and again are properly machined and fitted, breaks may be not uncommon.

One may venture perhaps also to look forward to a later period, when more slide valve engines come on to the market. The Knight engine naturally commands a high price. The company spent a large sum in working out the details of the engine, and they could only recoup themselves by selling at a high price. This limits the number of the sales. Later on, lower priced slide valve engines will be almost certain to come upon the market, very close copies of the Knight engine. They will probably not be made with the same care or of the same material, as the Knight engine, and they will probably get into hands that will not be as careful of them. Then possibly the poppet valve, if it has not completely gone out of existence, may come by its own again.

THE MAGNETO.

A Few Simple Points of Information That All Car Owners Should Know.

BY JAMES F. HOBART, M. E.

When the magneto is mentioned, it is ten to one that there is sometimes brought to mind one of the old-fashioned whirligig affairs with which it used to be necessary to call up the telephone operator. Now that the central energy calling system is in use everywhere except in remote districts, that little magneto is seldom seen.

But the modern ignition magneto is no more like the ancient telephone magneto than an ox is like a horse. True, both the beasts have four legs and a tail apiece, and the old and the new magnetos both have permanent field magnets and a shuttle-wound armature of the "H" type. Otherwise, there is the greatest imaginable difference between the bell-ringing and the ignition magnetos.

If you ever hear a man complaining about his experience with magneto ignition, just find out what type of magneto he has been using. If he has been trying the old-fashioned kind, and using a secondary coil with it, then he was probably right in his statements and had been having a hard time. But if he had ever tried the modern magneto, which needs no secondary coil, or rather which has a secondary coil contained in its winding, together with a condenser and a timer—if he has ever tried that form of magneto, there must be something radically wrong somewhere, or he would never have a

tale of woe to relate. The modern ignition magneto leaves nothing to be desired. It will do anything and everything that the dry-battery and the secondary coil can do, except one thing—it can't run down from over-use. The magneto is just as strong at current-giving after 72 hours steady use, as it is the moment it is first attached to your car.

Perhaps a few words concerning the principle of a magneto may not be amiss before looking into what a modern ignition magneto can do, and how it does it?

If you can get hold of a horseshoe magnet, it may be used to advantage in looking into magneto matters. If you have no magnet, just bend up a bit of steel to a U shape, harden it, and lay it on the floor of a trolley car

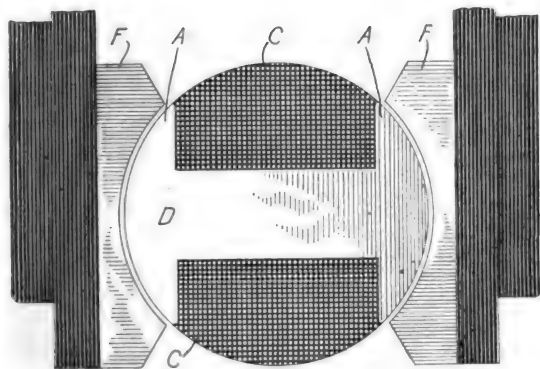


Fig. 1.—The Magneto at Sparking Point.

for a few seconds, and the magnet will be found permanently charged. Or, place the hardened steel about a generator or a motor for a few seconds and it will usually become charged very quickly.

Talk about the activity of radium and certain similar substances—it is not “in it” with a magnet for radio-activity. Just place the magnet flat, lay a clean pane of glass over the magnet and sprinkle on some iron or steel filings. A piece of smooth paper will answer if glass is not at hand. It will be noted that the filings arrange themselves in certain straight and curved lines, extending from one pole of the magnet to the other. These lines are called “Magnetic Lines of Force.” They seem the strongest and most plentiful where the magnet poles approach each other the closest. Put a couple of bits of iron or steel against the magnet poles in such a manner as to lessen the distance between them. This causes an entirely different arrangement of the lines of force.

Pass one side of a metal ring through the lines of force, and a current of electricity is caused to flow through the ring. Wind up a long, fine, insulated wire in the form of a ring or coil, pass one side of this between the poles of the magnet and a stronger current will flow—as much stronger as times the number of wires in the coil passed through the lines of force. Put some iron or soft steel inside the wire coil, then pass it through the lines of force and the resulting current is many times stronger than without the soft steel.

Thus, as the moving of a coil of wire across magnetic lines of force will cause a current of electricity to flow in the wire, it behooves us to make all the conditions as favorable as possible so as to obtain the maximum current possible.

As stated, the ordinary magneto is nothing but a coil of wire around a soft steel armature, moved in a permanent magnetic field. But the modern ignition magneto is far more than this. It is an improved magneto, primary coil, secondary coil, condenser and timer, all condensed into one machine. And it even goes farther

than this: It is also a combination of the ignition machine with which the dynamite man lets off many charges of dynamite at the same instant.

By a peculiar and improved form of construction, the modern magneto is made like a spark coil. It has a primary winding of heavy wire, just like the jump coil. And the secondary winding is connected right on the end of the primary winding. In the ordinary spark coil, the spark is obtained when the primary circuit is broken. A slight spark may be obtained when the circuit is mended, but the greater spark appears when the primary is broken. Then, all the magnetic potential bottled up in the soft steel during the passage of current through the winding—then, all that force is let go, and in passing out of the iron core through and around the winding, a tremendous voltage is set up for an instant, and by proper timing, the voltage is employed to drive current through the compressed gas in the engine, and cause ignition.

The modern igniting magneto, is therefore, a regular generator and transformer combined. It not only causes a high electric potential in the armature coils, but it also “steps up” that voltage to a still greater pressure by the regular transformer method of a coil with few turns for the low voltage, which introduces a very high voltage in the fine wire winding of the armature. As stated, not only is voltage builded up in the magneto by the direct action of a strong magnetic field upon the coils, but also by the separate transformer action of the fine wire coils and the closed primary coils of low resistance. The condenser is also present, usually built right on the end of the armature, and revolving with it. Also, there is a sort of timer which automatically breaks the primary circuit at the time of the greatest intensity of voltage or electrical pressure inside of the winding. And usually, there is also a sort of “lightning arrester,” consisting of a spark gap much the same as in a common spark plug.

So great is the power of the modern magneto, that a sort of electric safety valve has been provided whereby

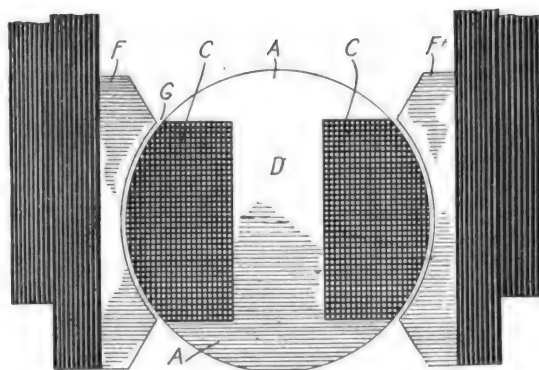


Fig. 2.—Magneto at its Neutral Point.

the spark jumps across, in case, from any reason, the voltage obtained in the coils has become so great that there is danger of its jumping through the coil insulation, and thus ruining the magneto. The spark gap is of such width that the normal ignition current could never jump across the gap provided. The gap, however, is so proportioned that the spark can jump it before it builds up enough voltage to force a spark through the insulation of the armature.

When ignition is done with magneto current, the speed of the generator and timing of the spark should be such that the armature of the magneto is at the point of greatest voltage, when the ignition takes place. This requirement makes necessary a good understanding of when the magneto will give its best voltage. Bear in mind that the magneto is an alternating current gen-

erator, and that the direction of current in its winding is reversed entirely and completely twice during a single revolution of the armature. Yet, this is the case, and the "building up" of the highest possible voltage must be done within the very short time of quarter revolution of the armature. And, as current in a magneto, builds up and dies out in one-half of an armature revolution, it is apparent that the timing of the magneto must be very exact for if the spark is taken off too soon, or too late, it will not be as "fat" as when the armature stands at just the right degree in the revolution.

Fig. 1 shows the magneto armature at the point when there should be the greatest electric tension on its winding. If a section of armature be cut out of soft steel and placed between the poles of a magnet, laid under glass and filings sprinkled on as described in a previous paragraph, it will be found that nearly every line of force is passing through the armature, and that hardly a single line is lost by straying away through the air.

All the lines of force which flow from fields F. F. into armature A. A. are compressed—so to speak—into the slight strip of connecting metal, around which the armature winding is placed. The number of magnetic lines forced through this small section of metal, is something enormous. In fact, the steel becomes completely "saturated" as the engineers express it. So fully saturated that no more lines of force can be crowded into the strip of metal. If any more are forced along, when the steel is saturated, they will pass through the air rather than try to pass through the already crowded metal.

And here is a point which helps to make the most efficient magneto. The amount of magnetic lines delivered by the magnets, must be just enough so the armature becomes saturated to the point which gives the best results. Consequently, if the connecting web in the armature is too small, enough lines of force cannot crowd into it and the coils are not fully energized. On the other hand, if the web contains too much steel, then the magnetic field becomes less dense and the resulting impressed voltage is not as great as when the core is exactly large enough and not too large.

It would appear at first sight, that the magneto should give its greatest voltage with the armature in the position shown by Fig. 2. But this is not so. When the armature is in the position shown by Fig. 2, there is little if any current in the coils while the armature is in the position shown. The reason for this is that the lines of force are passing through both coils of the armature in the same direction and what electrical tension may be worked up in one side of the coil is neutralized or killed in the other side of the coil where voltage of an opposite character is being impressed slightly—and very slightly at that, as the lines of force nearly all pass through the heads of the armature instead of through the web. This means that very little current can be made to flow with the generator in position shown by Fig. 2, which is called the "neutral point" because the current is at the point of changing from one direction to the other in the coils.

According to theory, the greatest strength of voltage should be when the armature is in the position shown by Fig. 1. That this is not usually the case is due largely to the lag of current in an alternating generator. It requires a certain length of time, even for the passage of electricity, and it requires an appreciable length of time to magnetise the armature and the coils. Thus, the time of greatest voltage lags behind the angle of rotation. And therefore, the faster the magneto runs, the greater must be the advance from the theoretical position of greatest voltage, as shown by Fig. 1.

It is customary to indicate the amount of advance given the armature, by measuring the distance the armature is ahead of the field which it has just left as at G, Fig. 2. Some makes of the improved ignition magnetos give a distance at G, of 7-16 to $\frac{1}{2}$ inch on three-cylinder machines, 9-16 to $\frac{3}{8}$ inch when the magneto is to be used on a four-cylinder machine, and the advance is increased to 11-16 to 1 inch, when the magneto is applied to six-cylinder automobiles.

The reason for this increase in the advance is due to the fact that the more cylinders in the engine where ignition is to be done, the faster the magneto must run, consequently there will be more appreciable lag, and the armature must be advanced more and more the faster the magneto is made to run. The same thing is done with the spark when the engine is to run fast. And the manner in which advancing the spark helps to increase the speed of the motor is simply by giving the charge of explosive gas time to become fully ignited by the time the engine cylinder containing that charge is at the proper point for an explosion.

It was stated that the magneto runs faster the more cylinders there are to be ignited. This is a fact, for when there are only two cylinders, the magneto should run only one-half as fast as the engine shaft. When there are three cylinders, the magneto must be speeded three-fourths as fast as the motor shaft. And when there are four cylinders to be ignited, then run the magneto the same speed as the engine. When a six-cylinder machine is to be supplied, then drive the magneto one and one-half times as fast as the motor shaft.

As the magneto armature must be in a certain position when a spark is to be delivered, it is obvious that this can be done only by making the magneto armature be at the place of greatest intensity at the instant the charge in any cylinder is ready for ignition. Therefore, with three cylinders, running 200 R.P.M., the magneto should run 75 R.P.M. This will give 150 sparks per minute, two for each revolution of the magneto armature. As there is an explosion from each of the three cylinders every other revolution of the engine shaft, there must be 50 explosions per minute, therefore the magneto must be speeded at 75 R.P.M., in order to give that number of sparks.

When there are six cylinders, running at 100 R.P.M., the magneto must be run at 150 R.P.M., in order to give the 300 sparks per minutes necessary to ignite that number of charges of compressed gas in the six cylinders. It will be noted that the advance of the armature, as speed increases, is toward the position shown by Fig. 1, and that when the spark is advanced in running, the spark is delivered nearly from the position shown by that engraving.

The Society of Automobile Engineers has not yet brought into existence any new scheme for horsepower rating. Although the formula does not take into account the stroke of the engine, some engineers say that it is a pretty good way of determining horsepower; that is, that it is about as near as can be got, because almost no set formula would arrive exactly at the proper rating.

The storage battery has now attained the beginning of a new era which makes it adaptable for an almost endless variety of uses. It is being made to run large torpedo boats, battleship machinery, trucks, locomotives, individual units in factories and current for lighting when direct current is not available.

RADIATOR REPAIR.

The Necessary Tools and How Best to Do the Work Correctly.

From J. N. Bagley, Nebraska.—Few shops over the country make it a point to repair radiators. They are usually sent to the factory or to some one making a specialty of repairing them. But almost any repair man can do the bulk of this work if he is fixed for it, and the cost of the necessary tools will not be such that they cannot be had in every shop.

A list of tools which can be used to good advantage for this work is as follows: A pan for testing, about 3 feet square and 6 inches deep as shown in Fig. 1. This pan should be made out of good heavy galvanized iron. As to the soldering irons, Fig. 2 shows a variety of shapes that will be found very useful in repairing radiators. "A" should weight about 1½ pounds and be forged to a long slim point as shown, after which it should be bent to form a small curve about the size of the radiator tube. B and C will be found very useful in reaching into the tubes about center way. D will come very handy in soldering the tubes to the top and bottom of the radiator. F will answer well for the small seams where but a little solder can be put owing to the looks. G should be used for a flat surface.

Fig. 3 represents a tool for slipping the fins apart so the tubes can be got at.

Fig. 4 shows a pair of tongs or pliers with flat bars extending an inch or so to either side, and will be found extremely valuable in taking the kinks out of the fins after they are pushed back to place.

An acid that will answer well in most cases may be

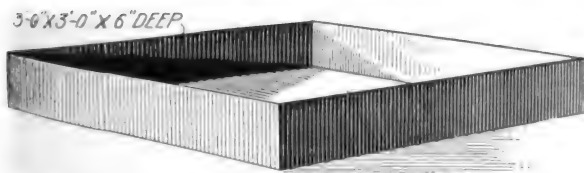


Fig. 1.

made as follows: Take muriatic acid and place into sheet zinc until it will cut no more. Strain it into a glass jar and add ¼ as much water as acid. To each pint of prepared acid add a piece of sal ammoniac about the size of a hickory nut. This aids in keeping the irons in good shape. This acid may be placed on the work with a small brush, or a glass dropper which may be purchased at any drug store.

Success will depend much on the condition of the soldering coppers, consequently much care should be taken to keep them bright and clean. The irons may be heated in a forge, but the cost is small to purchase a small gasoline furnace, and this should be used, as the irons will not be so apt to be overheated as in the forge.

Locating the Leaks.

As soon as the radiator to be repaired comes to the shop locate the leaks. This is done, not as many do it, by filling the radiator with water, but by filling it with air. Fill the pan, Fig. 1, with water to sufficiently cover the radiator. Now stop all openings in the radiator with a rubber cap, and with a small hose slipped over the drain cock at the bottom, the radiator may be tested for leaks. As fast as a leak is found it should be marked with some edged instrument, and so on until all are located. Remove the radiator from the testing pan and repair all the leaks, first by pushing the fins apart, as shown in Fig. 5, with the use of tool, Fig. 3.

After repairing all the leaks that are marked, take the radiator to the testing tank and see how many leaks are still to be found. After the leaks have been repaired and the radiator will hold air, the next step will be to

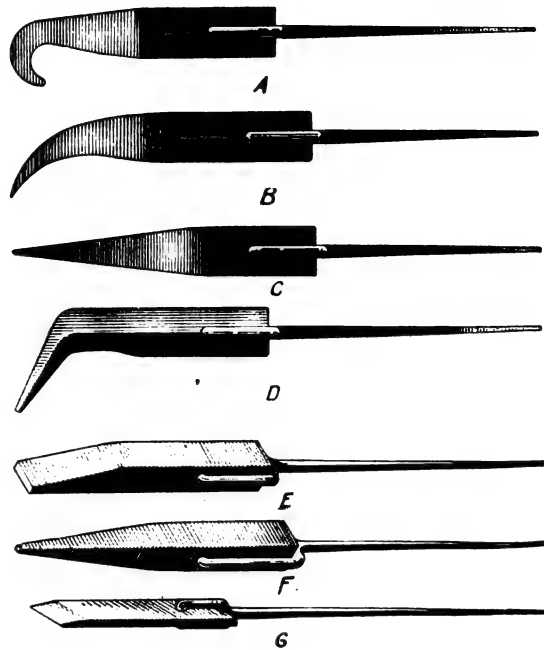


Fig. 2.

straighten the fins back to place, which is done with the same tool that they were separated with. After they are again spaced correctly there will be some kinks in them, which can be removed with the pliers, as shown in Fig. 4.

In Fig. 5 is shown the manner in which the fins may be separated to repair the bursted tubes. Of course if the radiators are sent to the factory they are taken down and new tubes placed, but as there are few who care to undertake this we will not go into details, for in most cases a soldered tube will give good results.

When the radiator has been repaired and the fins are put neatly back to place it should be thoroughly coated, fins, tubes and all, except the brass, with a coating of stove blacking. This will cover the bright spots of solder and make the job look much better. Next in order will be polishing the brass, which adds much to the looks of the job, and to the satisfaction of the owner.

The irons should be cleaned and retinned before putting away, and this may be done by heating them to a heat that will melt solder and plunging the ends into



Fig. 3.

the acid, as already described. This will clean them and they will again take tin quite freely. They should now be wiped with a damp cloth and hung up for the next job.

In using the sticks of solder they will become so short that they cannot be held in the hands. When they are so short they should be soldered to a fresh stick. In this way the scraps will be used up as soon as made and no waste of solder will be had. Many repair men do not care to attempt radiator repair and as soon as one becomes accustomed to the work he can solicit work

from adjoining towns, and it will be but a short time until there will be radiator business coming in to keep a man busy most of the time. In most places in the Western States the price charged for radiator work, solder and acid included, is one dollar an hour.

Many times the tubes of the radiator become stopped and prevent the circulation of water. In this case the

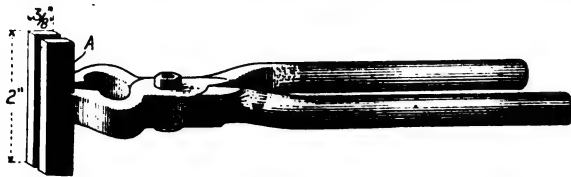


Fig. 4.

motor will overheat and the water will boil. In most cases this sediment can be washed out with water, although I have seen them stopped until it was necessary to remove the bottoms and run a small wire through the tubes. In case it is necessary to remove the bottom, care should be taken not to get the bottom hot enough to unsolder the tubes from the plate, which they pass through

The testing pan, Fig. 1, should be emptied as soon as



Fig. 5

through use, as the acid in the water, which comes from the radiator being dipped in and out, will eventually eat the galvanizing from the pan and it will soon rust out. The pan should be washed and set up to dry.

A Choked Pressure Pipe for the Oil Feed.

While a car was being driven one day the driver noticed that the oil drip feed failed to act as it should do. As, however, he had an auxiliary pump on the engine, he was thus able to avoid the necessity of any delay upon the journey. When, however, the car arrived at its destination he thought it advisable to take the pressure pipe off its connection to the exhaust pipe and the oil tank, and on examination he found that it was choked with soot or carbon. He first tried to remove the foreign matter by using a foot pump which he fitted to one end of the pipe and blew through it, but this failed to dislodge the deposit. He then went into the house at which the car had called and obtained permission to use the fire, and then by slightly warming the pipe and tapping it

lightly on the grate the pipe was gradually cleared, and after connecting it up again into position it was found that the oil drip acted without any trouble whatever. This simple hint may be of use to some other driver who may at one time or another be faced with the same difficulty.

Some Wrinkles Concerning the Engine.

On a certain occasion an engine knocked and also continued firing after having been switched off for some little time, due to pre-ignition, and it was suggested to the owner that this might possibly be due to a considerable amount of carbon deposit on the piston and in the head of the cylinder. This appeared to be a new idea to him, and he said that he had never before thought it necessary to look for trouble of this kind. However, when the engine was dismantled, this accumulation was found to be present. A good deal of this carbonization can be avoided by careful lubrication, and by using only a high grade of oil. There is always, however, the temptation, particularly among the owners of small power cars, to be rather free with the lubricating oil, and this chars under the high temperatures of explosion, and so the carbon deposit is formed. The carbon was removed and the pre-ignition stopped, as did also the knocks. The incident, however, led to the establishment of a working rule that periodically after a certain number of miles the engine should be taken down, overhauled, and examined for carbon deposit.

Another incident which was a little bit perplexing was in connection with an engine which after going well for a considerable distance, suddenly developed a popping noise, which could only be accounted for on the assumption that it was getting too much air in proportion to gasoline. After a time the engine stopped altogether, and the auxiliary air was then shut off. On starting up the engine again, however, the popping still continued, so that on the first opportunity the carburetor was opened up and cleaned out, as this appeared to be the cause of the trouble. The float chamber was thoroughly cleaned, but although the gasoline seemed to get in all right, it did not come so quickly as was usually the case. The spark plugs were then taken out and cleaned and the vibrators on the coil were examined. These appeared to be a little out of adjustment, and they were put right, and then the engine was run again. It is almost needless to say that the popping had then apparently disappeared, because while the car had been at a standstill the gasoline had filled the carburetor, and the supply was as much as was required. On traveling a little further distance, however, the popping recommenced worse than before, and periodically the engine would stop and remain stopped for a considerable period, after which it could be started up again. On getting the car home it was decided to take down the gasoline filter which was situated between the storage tank and the carburetor, and then the true cause of the trouble was at once discovered. This filter had become choked up with a lot of very fine particles of dirt and hence the gasoline could not get from the tank to the carburetor in sufficient quantity to keep the engine running. After cleaning the filter out the engine ran just as well as ever, and the auxiliary could be opened up again without weakening the mixture unduly. This was quite a simple cause for such a lot of trouble.

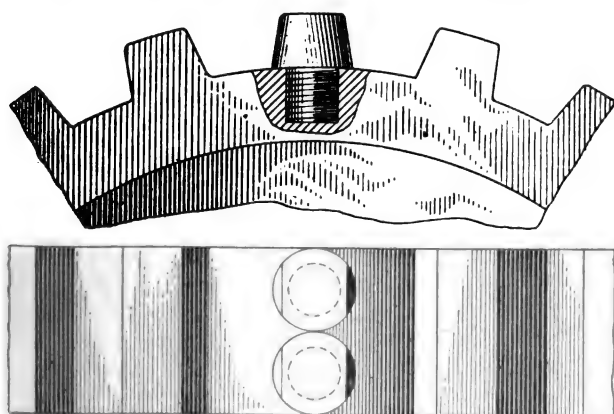
A Popping Carburetor.

Popping in the carburetor may be due either to trouble with the jet or float or it may be due to causes external to this part of the apparatus, and it often takes a skillful

driver to thoroughly investigate and cure such trouble. On one occasion a driver noticed a popping noise in the carburetor and he also found that he could not get very much speed out of the car. He therefore examined the carburetor to see if the jet was choked, or if there was any grit in the float chamber. He found, however, that both the jet and the float chamber were nice and clean and evidently the trouble was due to some other cause. He therefore next examined the inlet valves to see if they were closing properly, but found here that there were no evidences of anything being wrong. This led the driver to extend his search still further and he took down one of the valve caps and by using a piece of wire which was really art of an old spoke of a car wheel, he felt the top of the piston and tested the movement of the valves in relation to the position of the piston during a complete cycle of the engine. By this means he discovered that the timing of the valves was altogether wrong. After a good deal of trouble and experiment he ultimately managed to get the valve timing correctly, when the car worked like a new one. It was able to do about ten more miles an hour than its previous performance, and could take some hills on its top speed that before this it could only crawl up. In a difficulty of this nature, however, it is advisable to write to the makers of the car to get from them the particulars of the correct timing of the valves. With this at hand and by tracing the operations of the valves the correct adjustment can be very quickly made. If the makers' instructions are not available, however, it is necessary to go through a considerable amount of trial and error before correct timing can be obtained, but the result is usually well worth the time and trouble spent.

How to Repair a Broken Pinion.

There is no doubt that the method at present in general use of changing speed by means of cutting over from one set of gear to another imposes severe strains on the wheels and pinions and it is therefore not surprising to find that from time to time cases occur of



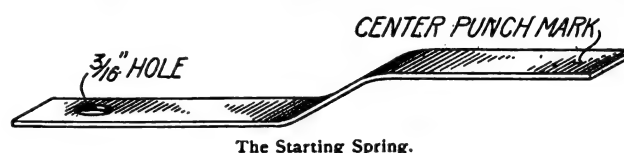
A New Tooth.

teeth stripping. It will probably be found that in some cases where a tooth is broken and this happens to be the only one which is affected, it is advisable to try to repair the wheel instead of getting a complete replacement, although if more than one tooth is broken it is probably the shortest way out of the difficulty to get a new wheel complete. If, however, it is decided to fit up a temporary tooth the best way to do it is to fit a row of steel pins along the wheel at the point formerly occupied by the broken tooth. In order to fit this the stump of the tooth must be carefully trimmed and filed down to the root so as to leave a plain surface for subsequent operations. The pins should be turned so as to have a small

shoulder on them, and below this shoulder a thread should be cut. A row of holes parallel to the axis of the wheel and truly radial to that axis are drilled in the metal of the wheel and tapped to fit the steel pins. These are then screwed into the wheel as far down as they will go until the shoulder butts firmly on to the metal so as to give a support for the tooth. They should then be trimmed up into shape as closely as possible like the shape of one of the teeth, and this repair if carefully and firmly executed, will be found to last for a considerable period although it must be pointed out that a repair of this nature will not stand undue strains. For this reason it is advisable to seriously consider the question of getting a new gear wheel or pinion should a fracture of this sort occur and it is only where the car is at the time removed from convenient workshops that the above repair is recommended.

How to Easily Start the Engine.

It is often found that the starting of an engine is more or less difficult owing to the fact that the initial charge or charges for starting purposes should preferably be rather richer than the average mixture during ordinary



The Starting Spring.

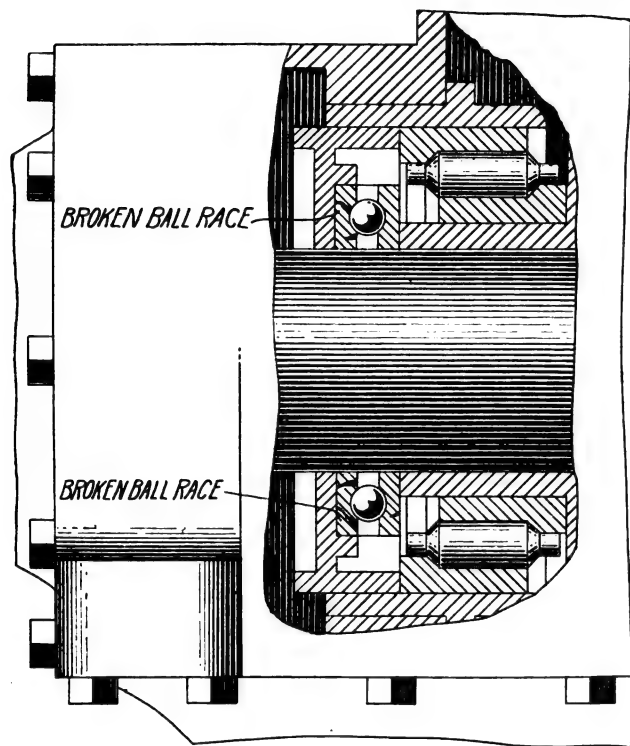
running. Some cars are fitted with an automatic air valve on the carburetor. In one such engine it was found rather difficult to start owing to the fact that when the throttle was opened a little for starting purposes and the handle pulled round, the automatic air valve would jump up and down and so allow a certain amount of air to get through. Although it was possible after a great amount of swinging of the starting handle to get the engine to start up in course of time, the driver naturally preferred an easier method of starting. He therefore put on his thinking cap and as a result obtained a piece of flat steel one end of which he drilled with a 3-16 inch hole while in the other end he placed a center punch mark in such a position that the needle of the valve could just fit into it. The shape of the spring when finished was as shown in the sketch. This was then fastened to the carburetor and after flooding the carburetor and having the air valve shut off the driver found that he had no trouble in starting the engine. After the start was made the spring was pulled out of the way in order to let the air valve open freely and it was found that this simple rig prevented a whole lot of trouble in getting the engine away.

A Broken Ball Race in the Gear Box.

The smooth and sweet running of a car is one of the primarily essential duties of a good driver, and should at any time any noise develop which sounds like undue friction it is advisable at once to get the matter inspected as until a sight is obtained of the trouble, it is impossible to say how far it may develop. Many a costly repair job might have been avoided in the first instance if the trouble which was developing had been given due attention. A mechanic is not the man who can execute a brilliant and difficult repair so much as the one who before a repair becomes necessary can locate trouble which is only in its initial stages and put the matter right without an undue expenditure of time or money.

In one instance while a driver was out with a car he heard a very audible grinding noise, somewhere at the back of the car, but could not definitely account for its

position while the car was on the road. At the very first available opportunity, however, when the car was in the garage, he made an examination and discovered that the noise proceeded from the back of the gear box. This was then taken down and it was found that the gear box contained a broken ball race. A new one was obtained and fitted and when the fitting of the new ball race was done the grinding noise had stopped. There is no doubt that the car would have gone on for a long time with the old ball race under normal circumstances, but on the other hand there was the risk that the race might possibly break up and in this way it would liberate the balls



which would probably have got into the gear box and jammed into the teeth of the gear. The amount of damage which this would have caused would have been very considerable so that this affords an example of the way in which trouble which is put right at the earliest possible opportunity in every probability saved a very much greater accident at a later date.

A Hot Crank Case and Its Cause.

The driver of a motor car frequently comes up against some unusual experiences. The car was getting along the road very comfortably indeed, when all at once the engine suddenly stopped. When the driver got down to open the bonnet he found that the crank case had become very hot and that the gas was coming out of the joints of the case. He therefore took the opportunity of trying the compression of the engine, and found that there was none, and it was quite impossible in spite of every effort to start the engine again. The only thing therefore which was possible under the circumstances was to let the engine rest a bit and cool down again, and after waiting for some time in order to give the engine this opportunity the driver found that he could eventually start it. When he reached home he took the engine down and found that two of the piston rings were broken. This at once explained the leakage of the gas and the heating of the crank case and also explained why he found it so difficult to start the engine again. When he had obtained new rings and fitted them he found that the

engine ran without any further trouble. The incident is instructive as showing the necessity for keeping an eye on the piston and its rings to see that there are no cracked rings as trouble can very easily develop from this cause.

AUTOMOBILE DEALERS.

Should Keep In Touch With Owners and With Cars Sold.

From G. D. Crain, Jr., Kentucky.—Most automobile dealers do not realize the advantage of keeping in touch with every owner of the cars which they handle, even though they have not made the sale themselves. The present owner of a used car is usually a live prospect for a new machine of the same make, provided he is not influenced in another direction by the dealer who sold him the car in its used condition.

It is not always possible to learn who own cars of a given make in the territory of the dealer, yet such information is worth procuring, even if at considerable expense. It is a veritable mine of information, besides being, as indicated, a list of prospective buyers of new cars which can be utilized constantly in developing business.

A well-known dealer in an Ohio Valley city has been using such a method ever since the old bicycle days, when the demand for wheels warranted a careful system of looking after business. He keeps a record of all his sales of cars, whether new or old, and in addition supplements this by information as to other cars of the make which he handles, this information being secured in various ways. Though he is handicapped by the fact that his city and state license departments do not register the name of the car when the license is issued, he has nevertheless kept track remarkably well of the cars in his territory.

One of the chief advantages of this method comes through the added value of his mailing list. Circular letters, descriptive literature and other publicity matter are sent to those on the list who own cars turned out by the factory which he represents, no matter whether he sold the cars or whether someone else put it out. It occasionally happens that a new resident appears who purchased the car in another city. His name is immediately added to the list, and the sales influences are turned on him, usually resulting in a sale developing when the car becomes ready to be turned in on the purchase price of another.

Now and then a car of the make handled by this dealer is traded in on the purchase of a car of another kind. In that event the dealer makes a special effort to learn the terms upon which it was traded in, and also the price at which it was later sold. The latter information is of big value in connection with sales of new cars. This is how it works:

"How long ought a machine be expected to last?" inquires a prospective purchaser.

"Well," says the dealer, "the best way to answer that question is to show you what the cars have actually been doing in service. Let's look up one in the file. Here's Card No. 188. It records the service of our car, carrying factory number 20028. I sold that machine to Owen Davis in 1908. He used it until the fall of 1910, when he traded it in on a new machine. We sold it later on at 50 per cent. of its original cost. The purchaser used it a year, traded it in on another car handled here, which we do not sell, and was allowed \$800 on it. It was sold a few months ago to George H. Allison, who lives in a suburb, and drives it to and from home every day, running about 25 miles. He paid \$500 for it, and is so

pleased that he told me recently he intended to buy a new car of the same make in the spring. That shows the machine has been giving good service, doesn't it?"

That sort of detailed information is usually worth a whole lot more than a lot of generalities which the dealer merely gives as his own personal opinions. In fact, the prospect is looking for actual data, and not for prejudicial opinions. When he learns that a car has been in service for four or five seasons and is still doing good work, he is a whole lot more impressed than if the dealer merely asserts that his car will run 50,000 miles at a maximum upkeep and depreciation expense of two cents a mile.

In addition to recording the changes in ownership of the cars in which he is directly interested as the sales representative in that territory, the dealer also just as carefully lists the records of the used cars of other makes which he himself sells. He undertakes a sort of supervisory service for them, and keeps in touch with these owners, believing in the first place that he is to a large extent responsible for the service which the cars afford, and in the second that this is the surest way to cultivate new business. The purchaser of a used car of one make, given the right kind of service by the man who sold it to him, is pretty likely to buy the car suggested by that dealer; for he will consider service as much as he will the car itself.

The dealer referred to believes that the list of owners which he has built up in this way is the most valuable single record which he possesses. It is the basis of a mailing-list which is kept carefully up to date, and which is corrected constantly. The entire list is transferred every year, in order to make the weeding-out process all the more complete.

The card used is 5x7 inches and is easily handled. It carried the sale and factory numbers of the car, the name of the car and the date of its sale. Below is ample space for memoranda as to the name of the first purchaser, the price paid and the length of service given; the names of succeeding owners, with prices paid, etc. As indicated, the older such a record becomes, the more valuable it is; and in the case of this member of the trade, who has been compiling the data for ten years, as he was one of the pioneers in the business in his city, he has facts which are invaluable when in competition with other dealers. He can give rock bottom statistics, while the best the others can do is to estimate.

A Persistent Engine.

Although there are very many instances where a motor car engine refuses to run when it is wanted to go, there are not so many cases where an engine persists in running when it is required to stop, and when this occurs there is evidently some reason for the driver to investigate such uncanny behavior. In one case when a car was taken out, the engine at the end of its run was switched off in the usual way but it was found that it still kept on running and the only way in which it could be stopped was to put the first gear in and to apply both brakes as tightly as possible. Then when the clutch was let in rather suddenly the engine consented to stop. It was, of course, very necessary to examine the engine after this to find out why it behaved in such a manner and it was found that this running after being switched off was due to pre-ignition caused by a large amount of carbon deposit on the piston. This deposit had become red hot and therefore was capable of firing the charge brought into the cylinder. The engine was therefore taken down and the carbon deposit was cleaned off and it was then found that all trouble due to pre-ignition was effectively removed.

This points out the necessity for careful and systematic overhaul and cleaning of the engine because if this had been attended to in the beginning there would have been no trouble from this cause.

There is another way, however, in which such persistent running can be caused, and this is sometimes found to be due to the fact that the points of the plugs have become fouled with carbon deposit. It may be mentioned in connection with this trouble that there are on the market several very good compositions which will remove the carbon from the piston and cylinder without the trouble of dismantling the parts, but all things being considered it is perhaps advisable not to rely too much on such methods except as interim methods, the greatest safeguard being found as mentioned above in a thoroughly good overhaul made as a matter of rule from time to time at such frequent intervals that no part of the engine can suffer undue deterioration without this being detected in time.

Practical Kinks for Car Mechanics.

Many of the worries in the motor car garage and repair shop are caused not so much by the heavy nature of the work which has to be done, but rather by round-about methods for doing comparatively simple jobs and it may therefore be of advantage to mention two very simple kinks which have been found in practice to save a good deal of time and trouble. One of these is in

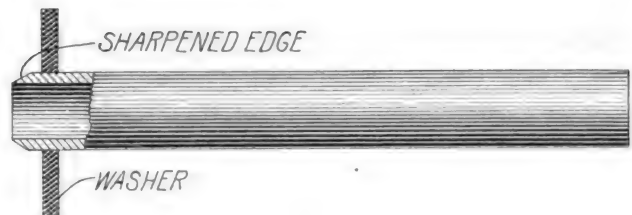


Fig. 1.

connection with the cutting of washers out of rubber sheet. As is well known, rubber washers on a car are very useful, because, for example, when one is fitted to lamp brackets it breaks the jar or vibration and many other services for such washers can be readily thought of. Moreover these washers can be very readily cut out of a piece of sheet rubber. In order to do this, a piece of rubber the required thickness is obtained, and the outside rings of the washer is very easy to cut with a knife or pair of scissors if these implements are well wetted by dipping them in water from time to time while cutting is being proceeded with. In order to cut the inside ring of the washer, however, a small appliance of special nature should be made. This consists of a piece of metal tubing, Fig. 1, either brass or iron, whose diameter should be a little less than that of the hole which is desired. The outside edge of the tube is then sharpened to a keen edge by means of a file and this gives a circular cutter, which if dipped into water in order to thoroughly wet it and then forced into the rubber gives a clean circular cutting. This method will be found quite easy and simple to apply in practice.

The other kink which may be given is in reference to making a taper pin. It is often found that when requiring taper pins it is not convenient to get one of the right size, especially if the car which is under repair is located in the country away from the usual centers of mechanical engineering, and therefore it may be interesting to describe how this can be made very rapidly and simply. The raw material consists of a piece of steel rod or wire whose diameter is that of the larger end of the finished taper pin. This piece of steel should then be put into the chuck of a hand drill and the drill should be

fixed in a vise. A piece of wood should then be obtained and placed so that the steel rod which is to be operated upon can rest firmly upon it. The drill should then be rotated with one hand while with the other the steel can be filed to the taper. In the case of the larger sized pins or indeed in any case where it is found awkward to revolve the drill with one hand and file with the other, it is very easy to utilize the voluntary services

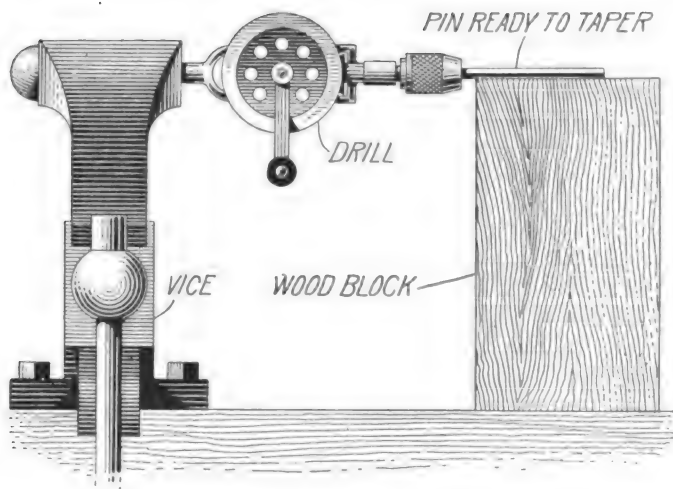


Fig. 2.

of a small boy to turn the drill while the driver can devote his attention to filing the rod smoothly and to the required taper. By this means a very good taper pin can be made at very little cost of time and trouble.

A SELF STARTER STUDY.

Devices Working on Different Principles, Their Advantages and Weaknesses.

From Engineer, New York.—The day of self starters for automobiles is here, and from now on every manufacturer of motor cars must consider and cope with this requirement. What must be had is a real starter, for the car of the future will be judged equally as much by the method of starting the motor as by its performance, appearance, or in fact any other feature. The question today is what will be the ultimate form to be expected by the public, as representing standard and reliable equipment in reference to the starting feature. There may be considered, several devices working on different principles, namely:

Those that depend upon pumping a carbureted mixture into the cylinder and those that put acetylene gas into the cylinder, both of these depending upon the spark firing the charge to start the motor; those depending upon a spring wound up by the motor; then comes the air starter and finally the electric starters. Each of these classes can be sub-divided according to the method used, but as the final results are practically the same in each case, we will simply discuss each class as a unit.

One form of a self starter is that which depends upon the pumping of a carbureted mixture into the cylinder, or the putting of a charge of acetylene gas into the cylinder and then depending upon the spark to fire this charge and start the motor. It is not easy to imagine that a motor will always start on the spark, and if a motor will not start every time on the spark directly after stopping, when the cylinder is full of the exact mixture that it was just running on, how can we expect it to start when cold and on a foreign gas? Still it must be admitted that if this form

of starter will invariably start the motor, it is so simple that it should displace any other form of starter, but as it does not either rotate the crank shaft or even permit of placing the pistons within the firing zone, should they by chance have come to rest in a wrong position after stopping, it will be evident that this type cannot be a positive starter, and as we are seeking for the most positive method, it is useless to further discuss it.

Next in order are those operated by a spring wound up by the motor. These have the fault that, provided the motor fails to start the first time the spring is released, it is useless when it comes to try the second time, which might be necessary for several reasons, such as trouble with the carburetor being stopped up; or one might have turned off the gasoline for one cause or other and forget to turn it on again, or he might have forgotten to turn on the switch, or there might be other reasons for a motor not starting on the first turn, or even the first several turns, so without even considering this form, such as broken springs, worn ratchets, etc., it may be seen it will not quite fill the bill.

Now we come to the air starters. While it must be acknowledged that air has its faults, as at present applied, there is a cure for each of these faults without adding any great amount of complication or sacrificing durability, for if a car is no longer lived than its weakest part, if its starter gives mechanical trouble or wears out rapidly, it affects the durability of the entire machine. The source from which the air is obtained is the first and one of the most important features connected with this type of starter. The air cannot be taken from the cylinder during the power stroke, because it will only supply the necessary pressure while the car is in operation and then only when the motor is laboring under a heavy load sufficient to cause the pressure in the cylinders to equal that required in the tank, which requires that the car be run at least twenty miles per hour on high gear, and if this speed cannot be maintained, then it is necessary to slow the car down to a walking pace, throw on full throttle and pick the load up suddenly several times, which not only injures the motor, scrubs out the tires, racks the whole machine by straining all the gears, shafts, etc., but makes for very uncomfortable riding. Then again, this method is liable to clog the pipes, valves, distributor and tank with carbon and other foul matter from the burnt gases, and at the same time takes so much power from the cylinder furnishing the pressure as to cause it to have the same effect on the nerves as skipping. Thus it is plainly evident that a positive pump must furnish pure, clean air to the tank, and this pump must be so located that it is in operation when the motor is running idle, so that the tank can be filled to the desired pressure without operating the car at all, also that tires can be filled with it adding another advantage to this type of starter. The distributor valve is where these air starters have often met their Waterloo, converting them from starters to near starters. First by not being able to rotate the valve or its casing just the same as a timer is advanced and retarded, they were unable to start if by chance the piston had proceeded on the power stroke to the point where the exhaust valve was open; or if the motor was in such a position that one piston coming up on compression and another going down on the power stroke, both had the air ports in the distributor uncovered at the same time, as the pressure trying to force the former backwards would just equal

the attempt of the same pressure trying to force the latter in a forward motion; or if the piston pushed forward on the power stroke being so near the point where the exhaust was to open, as not to gain sufficient momentum before the valve was opened to carry it over the center so that the next one could get started. For by advancing the distributor you are able to push the piston backwards, that is coming up on compression until the one that has previously gone down on the power stroke is forced back to a desired position, when by again retarding the distributor valve and applying the pressure, this piston is forced to do the desired function of starting.

Thus it will be seen that unless the distributor be rotatable, a positive air starter is impossible, and even with it it is possible to so place the pistons in the cylinder that a start cannot be made. In other words, a rotatable distributor makes impossible a starter that will positively start, even provided there is sufficient pressure in the tank to turn the motor over. Then by holding the valve in the distributor against its seat by mechanical means, it wears out rapidly, causes it to leak, and to fail in the performance of its duty. The proper way to construct this valve is to give it or its shaft a lateral movement so that it may free itself from its seat when the motor is running on its own power. Then by causing the air pressure when applied for starting to seat this valve, we avoid all wear except that which is produced during the actual time that the pressure is on while making each start, which should give us a valve that would outwear several engines. Again, the shaft journals in the casting of the distributor should not require either packing or lubrication, nor should they effect in the slightest the working of the starter if they become badly worn, for if these bearings require packing it will be almost impossible to keep them tight, owing to the rotation of the shafts while the engine is running. This feature is overcome by causing the seat of the valve to extend from the ports to the journals so that when the valve is seated the same resistance forbids the air passing out of the shaft boxes. This gives us an air starter with a positive means of supplying pure fresh air to a tank, the desired pressure while the engine is running idle, with a positive trouble and wear-proof distributor that will start the motor every time except when the pistons are on dead center in all kinds of weather, with nothing to wear or get out of order. It will at the same time do away with the next meanest job on an automobile, that of inflating the tires, and if the pump is provided with a diaphragm pressure cut out, nothing is being taken from the motive power when pressure is not required. This passes us on to the electrical starters, which must be most seriously considered in competition with others.

The electrical starter, which also furnishes the current for lighting and possibly ignition, should on the first thought be our final choice, as a starter that will supply its own source of power by charging a storage battery, and which will be positive, which will turn the motor, as often and as many times as we desire, and which is at the same time furnishing light and even ignition from the same battery, would appear to be all we could ask.

At the headquarters of the United States Motor Company, 3 West Sixty-first street, New York, a demonstration of the new Hartford electric self-starter was recently given which may well be referred to right here. One novel point of this self-starter is the fly wheel on the armature shaft in which the

energy of the small motor weighing about 20 pounds is stored while traveling at its normal rate. The motor is rated at 1-3 h.p. and is operated by a 16-volt, eight-cell storage battery. In using the starter, the operator makes the electrical contact starting the dynamo, and through this the clutch shaft. He then slowly lets in his clutch. The engine is thus turned over until it takes up its regular cycle. As soon as this occurs, an automatic clutch throws the motor out of engagement with the clutch-shaft of the car. The amount of current which it consumes in starting an average car is said to be less than for any similar device. This motor was designed to run at a very high speed; about 7,000 R. P. M. The gearing consists of a worm and a worm wheel and a spur gear and pinion, giving a ratio of 100 to 1. This will turn the Thomas 72 h.p. six-cylinder car at a speed of 70 revolutions per minute. When revolving at this very high speed, it adds the stored-up energy to the torque of the motor when the intermittent resistance of rotation is offered by compression. The advantages of this constant speed of the motor gives the proper ignition and saves battery current during the compression periods.

Now if the car or engine be operated for a sufficient length of time between each start, so as to allow the separate current generator to replace the amount of current used by the previous start, together with the additional amount used for lighting or ignition purposes, then all of our anticipations are realized, and the electric starter leaves nothing to be desired. This condition, it is claimed, has been carefully arranged for, by the employment of a charging generator with a capacity far in excess of any demand that would be made upon it, for starting, lighting and possibly ignition, and as a further safeguard the capacity of the storage battery is said to be sufficient to operate all the lights continuously for several hours, should the car be still and the headlights burning, a condition not likely to exist. It is also claimed that with a fully charged battery, the car can be started 30 to 40 times per minute with all the lights burning, and that at 10 miles per hour more than sufficient current will be put into the battery to keep all lights burning. When the storage battery is fully charged any excess of current generated is of course wasted, but it seems better to waste a small portion of the power of the engine than to risk the possibility of insufficient current, which would mean the ruination of the battery from exhaustion. This system would thus be well adapted for the use of doctors, contractors, collectors and others who use their cars for business or pleasure, shopping, theatre going, clubs, calling and other purposes, such as delivery wagons, trucks, etc., where the motor might be stopped often and the lights used a great deal. The fact that a complicated controlling series and parallel switch is not necessitated with this system is a strong point in its favor in the way of simplicity, making it more easily understood and not necessitating a qualified electrician for its care and upkeep. The only disadvantages of this starter it seems to me lie in the fact that it is considerably more expensive than acetylene or gasoline starters, and that it has to be built into the car, not being adapted for installation unless provided for in the design of the motor.

Do not throw away defective inner tubes. Save them. The sound sections can be joined and practically new tires made from them.

MOTOR TRUCKS.

What They Will Do and How to Successfully Care for Them.

(From an address by B. A. Gramm, in Dayton, O.)

As time is one of the most valuable assets we have, I will try to confine myself as strictly as possible to my subject, "How to Successfully Use Motor Trucks."

That the absolute necessity of the use of motor trucks is becoming more and more apparent I do not think would be questioned for one moment by anyone. Especially has this necessity become apparent in the large cities, where the traffic has become so congested that it is almost impossible to handle business from a profit making standpoint, unless overhead expenses can be materially reduced and time gained.

In a talk a few weeks ago with the commissioner in New York City, he stated that in a very few years New York City would have been confronted by a proposition that would be almost beyond their reach but for the timely arrival of the motor truck. While streets cannot be enlarged and stable property has become so valuable and the maintenance of horses on account of the high costs of their up-keep are almost prohibited, the motor truck solves the entire problem.

Just a glimpse as to the tremendous influence on this industry are the statistics shown up recently, in which we have about 24,000,000 animals, whose value will run about \$2,600,000,000, and the net increase in the last ten years has been but 11½ per cent., while increase in value has been 137 per cent. If one 2-ton truck was used in the place of every six animals, it would take 4,000,000 trucks to take their place. If only 10 per cent. of this amount were put into use, it would mean 400,000.

It takes a much larger plant equipped on different lines to build trucks than pleasure automobiles, as there is a wide difference in their building, and today the largest motor truck factories in this country can turn out but from 1,000 to 1,500 trucks per year. It is true that a great many of them are going into business, but even if 20,000 would be built every year for the next five years, we would only have one-quarter of the number required even on such a small basis. Competition in business has gotten down to such a fine science that it takes extraordinary means to succeed; that there is just as much opportunity for great success to any one of your companies as there ever was, is proven by the fact that today we have springing up here and there great successes from small beginnings. There certainly must be some distinctive reason for their success. The main reason is originality. How to get your goods before the public, how to best advertise them, how your customers can get to you the quickest, and last and above all, how you can give them the earliest deliveries and keep up the best service.

No arguments can be brought forth any more to prove that horse delivery in the furniture business is superior to introducing motor trucks. We have too many bright examples of their success, but we also have examples of different concerns, who claim they have not made a success with the use of their trucks, that their maintenance has been expensive, and in every case the blame has been laid to the fact of the manufacturer of the truck. It is true that there are a good many trucks springing up that have not the company or factory back of them, or the origination to perfect and maintain, but I can state to you from a complete knowledge and experience, that 75 per

cent. of all truck troubles today arise purely and simply because owners do not know how to use them.

I want to quote you just a few words from Mr. H. E. Hunt, superintendent of Sulzberger & Sons Company, Chicago, among the very largest meat packers in the United States. I happen to know considerably about their service, owing to the fact that they have adopted Gramm trucks exclusively. He states his reasons very plainly. "A 30-mile journey will wear out a team so that, in many cases, it is necessary to give the horses a full day's rest. They are also depreciable and liable to injury of all sorts, and the truck, when they first started using it, was liable to every kind of injury that was possible to imagine, but that is not the case today." The trouble is—the people who run them do not know how. They never had any experience with autos until they invested in them, consequently, a lot of break-downs are inevitable. The first truck they bought ran up bills almost fiendishly. Today that same gas wagon is the best they have, and it is over three years old. The men studied it and got so they could put their finger on their ailing places with a little loss of time, and this truck, with all the others, is capable of going 60 miles a day with an average of three tons.

Care should be taken in selecting a first-class driver. It is not necessary that you get some expert automobile man. Nine times out of ten he will try to drive it like he would a touring car, but get a good, reliable, honest man, who will study the parts catalog and the instruction book thoroughly, and what he does not know he will not be afraid to ask. Let him find out what is meant by normal rate of speed, and let him feel that he should handle that truck as carefully as if it was his own and every dollar he had in the world was invested in it.

If you buy a one-ton truck do not haul two on it, if you buy a two-ton do not haul three, but in the first place, purchase a truck that is thoroughly suitable to your business, even if it costs a little bit more than some others. Do not let a salesman talk you into a truck simply because he wants to make the sale. Go to a good, experienced man who you can rely on, and let him investigate your conditions as an architect who builds your house.

You must have a good, clean place to keep it. Fix a bench, a vise and some few tools and be prepared so that small adjustments and repairs can be made. In this way repair bills will be almost unknown. If the driver is a little careful in driving and does not deliberately go into chuck holes and across street car tracks, you will find that your tires will last twice as long and that your truck will also last twice as long. Stop and consider that a railroad locomotive never runs over from 100 to 150 miles without going into a round house for careful expert attention (remember it is running on steel rails and is a large, powerful piece of machinery) while the motor truck you buy is being expected to run 3,000 to 5,000 miles without being touched. Frequently the oil is not even changed in all this running, and the filth and dirt becomes so thick that you could not make adjustments because you could not find the place. Give your man time to give the truck attention and hold him strictly responsible for it. Get a good man and pay him a little more money to give it attention. Place him on a premium basis, that you will pay him in proportion to the small amount of repair bills you have.

In almost every case the owner listens to the driver, and when he states that the trouble lays with the

truck, it is immediately believed and the manufacturer is jumped on. Of course, there are cases that will turn up in which the part may be defective for with the most scrutinizing care of a large number of inspectors there will be parts go through in which no living person can see that the inside is perfect, but you will find that the manufacturer will be only too pleased, if it is brought to his attention in a business-like way, to replace it without charge.

Where you begin to use a number of trucks, for here is where you begin to make your business a successful one, figure out the number of square miles you are doing business over, then see how large an increased area of square miles you could handle by the use of motor trucks. Have them beautifully finished with your ad in bold letters. Remember that here is a moving billboard that does not cost you a cent, and you will be amazed at the thousands of prospective customers you can reach that you never could before. Figure up the saving that you will make from crating and shipping furniture to people in small towns, where either you or they have to pay the freight, at the same price that you deliver things in town, when now you can lay out regular routes and cover all the territory and deliver the goods from your store to their homes in less time, with ever so much less expense, than you could crate and ship. Where it would take a team of horses two days to go 25 miles, you can load up your truck early in the morning and be back by noon. When it comes to winter and in the snow, no matter how smooth the ice is, the truck can always be gotten instantly, while it takes time to have the horses shod. A few weeks ago in New York City, I could not stop at a corner without seeing a number of horses down in all directions.

I cannot help in a way from referring to the use of motor trucks by the Cappel Furniture Company of this city, who have gone into the matter along right lines, and who have shown an immense saving over their wagon service by the use of motor trucks. You can have a very fine garage to take care of your trucks and keeping a great deal smaller space with less money invested to take care of twice and three times the business you did under the old method, and even when you pay more money to your drivers, as it takes less trucks than it did wagons, you will make a saving of from 25 to 35 per cent. Of course, every locality needs a little different, and I would advise you that to go into purchasing trucks for your business, which you surely should do if you wish to make a big success, is to not be afraid to get what is absolutely right, and then figure up what it will cost you, then go to a first-class, reputable truck manufacturer, give him your exact road conditions surrounding your place of business, the conditions of your streets, the grades, and all other information, and he will give you the correct equipment. Above all, it is wise to go direct to the factory and to several factories before you select.

The plants are also giving minute attention now to service, and where they may have been lax, you will find they will soon be perfect.

Some motorists have adopted with success the practice of using a small amount of glycerine in their cooling water, as a scale preventative. The glycerine in the radiator has a tendency to eliminate the formation of a scale. A proportion of one-half pint to each five gallons of water is sufficient.

COST OF RUNNING.

A Rough Estimate Which May Be of Use for Comparison.

One of our readers asks us what it should cost per mile to run a car carefully in a large city and its suburbs. This is a hard question to answer, but perhaps the following will be of some assistance to him:

Taking care of his own car is not always solely a matter of economy. The man who trusts entirely to the chauffeur frequently, through his own ignorance, skimps his car. Many times, without knowing that his chauffeur ought to have time to clean out the crank case and put in new oil, or that the cylinders need scraping, or the valves a slight adjustment, he will insist that he "let it go for today" and do it tomorrow. That is costly to the car, and eventually to the owner, for when the automobile requires a thorough cleaning and refilling with grease and oil it needs it just as badly as a starving human being needs refilling with food.

Two heads may be better than one in some cases, but they are not in the operation of the automobile. Many an owner realizes this and prefers to do the driving himself. Two men, no matter how careful, will have slightly different ways of shifting gears, of engaging and releasing the clutch, of opening and closing the throttle, of taking hills, ruts, corners and conflicting opinions, with the result that the car will not give the same performance over a given stretch of road under the owner as under the chauffeur. The employer thinks the chauffeur is to blame, while the chauffeur is sure the owner never will know how to drive. Under either man the car will do the same thing on the same road time and again, so the owner decides that he can get the best out of the car himself, and in many cases he is right.

Every automobile has its own peculiarities. One will take more oil than another, one will eat up tires faster, another will use more gasoline, more grease for the differential, universal or transmission, but almost any two cars with the same size engine will, under similar conditions, cost within a few dollars of each other.

Probably one-half of the automobiles today cover from 1,000 to 1,500 miles a month. That will mean 20 to 50 miles a day during the week and a Sunday run of 50 to 150 miles.

The average four-cylinder car of from 30 to 50 h.p. will get from 12 to 15 miles out of a gallon of gasoline, while the smaller cars, with less piston displacement naturally will consume less. Many of the 18 and 20 h.p. four-cylinder cars of the light touring variety will get from 20 to 30 miles out of a single gallon of gasoline. Cylinder oil is consumed more slowly, the cars running from 100 to 150 and 200 miles a gallon, according to the size of the car. Grease for transmission, universal and differential will be used up at the rate of from 5 to 20 pounds a month.

A man who wishes to keep his car in a garage of his own, he can put up one of metal for \$75 to \$100. He purchases his gasoline by the barrel for 13 cents a gallon. His cylinder oil he buys by the barrel at 40 cents, and his grease he can get in 100 pound cases, reducing the cost about one-half.

The man who drives his own automobile and has business cares to keep him occupied during the day, does not find any too much time to travel and will cover scarcely more than five to seven hundred miles in a month. He usually goes home around six o'clock,

finishes his dinner by seven or half-past and then takes his family for a ride of two or more hours.

Sunday trips will average less than 100 miles. It is not a question of what the car can do, but what the human being can stand. A Sunday ride of 100 miles, with normal stops, will take almost the entire day and make the occupants of the car fatigued.

As an average, the speed in the country will come under 20 miles an hour, because persons, after they have been driving some time, find that a much more comfortable and economical rate of speed. It is easier on human beings and it is easier on the automobile and less expensive.

Cost of Keeping an Automobile.

Car of 30 to 50 h.p., 1,000 to 1,700 miles a month:

	City	Country
100 gals. gasoline	\$18.00	\$16.00
5 gals. cylinder oil	3.75	2.50
20 lbs. grease	2.00	2.00
Lighting	3.00	3.00
Storage	7.50	....
Washing	3.00	....
Approximate tire wear	8.00	8.00

\$45.25 \$31.50

500 to 700 miles a month:

	City	Country
Gasoline, oil, grease, lighting, tire wear	\$15.75	\$12.75
Storage	7.50	....
Washing	3.00	....

\$26.25 \$12.75

Cars of 15 to 30 h.p., 1,000 to 1,500 miles a month:

	City	Country
50 gals. gasoline	\$9.00	\$8.00
4 gals. cylinder oil	3.00	2.00
Lighting	2.00	2.00
Storage	7.50	....
Washing	3.00	....
Approximate tire wear	5.00	5.00

\$29.00 \$16.00

500 to 700 miles a month:

	City	Country
Gasoline, oil, grease, lighting, tire wear	\$9.25	\$7.25
Storage	7.50	....
Washing	3.00	....

\$19.75 \$7.25

Oil Quantity and Quality.

Insufficient oil is as bad as inferior oil and too much oil will likewise cause a good deal of trouble. With a motor lubricated with the splash system great care must be taken to see that the level of the oil in the crank case is held to such a point that the connecting rod just touches it. In the gravity or force feed system the same care should be taken to prevent an excess of oil being fed. If too much oil enters the cylinders, it may cause fouling of the spark plugs and valves, also carbonization in the piston rings, any one of which will cause loss of power. An oil rich in lubricating properties will give the maximum efficiency with the minimum amount of oil, whereas with the use of an inferior oil, not adapted for the purpose, a larger quantity is required to secure lubrication, resulting in carbonization and fouling.



This department is intended as a "trouble clearing house" for car owners, dealers and repairmen. Inquiries in relation to marine motors will likewise be answered, as they are of interest to car owners and others who use the two-stroke cycle engine.

Readers are requested to make criticism and comments or to freely discuss any subject of interest to the automobile industry, and to add information of their own experience in remedying troubles.

Inquirers are asked to give the fullest information in every case so that replies may be made intelligently, and thus be of interest not only to the inquirer but to others.

862

A Foul Spark Plug

From Geo. W. Blaesser, Wisconsin.—What is the cause of our spark plug fouling with carbon when the others remain comparatively clear? When I take my Ford car out of the barn (cold) she pounds on three cylinders, from No. 1 front, for about two hundred feet, then runs on four, but as soon as she reaches a hill or I crowd the engine a little for speed, she misses. Have examined the timer and wires and they are O. K. Can it be a valve sticking in the cylinder that fouls the spark plug? Missing is not bad after the engine is hot, but annoying, especially on hills.

Reply.—The remedy for preventing "fouling" of the plug in the forward cylinder of the Ford and many other cars is to carefully wash out the cam shaft gear housing with kerosene, put in a half pint of fresh oil and cut down the supply of oil to the forward cylinder. This trouble is often caused by an accumulation of oil in the cam shaft gear casing which splashes to the forward cylinder, giving excessive lubrication. If you will remove the brush on top of the generator you will probably find some hairy particles of carbonized fibre on it. These should be carefully removed. If missing still continues try reducing the air gap at the plugs just a little. Sometimes this will remedy missing at high speeds.

863

Those Rear Axles.

From J. H. Holmes, South Dakota.—I don't agree with Mr. Warner about rear axle truss for Ford cars. I have used one and I know what it is. It is a point that every man must see is a good thing, because it supports and braces the axle, and anything that will make a car stronger is well worth having, because an automobile is never too strong. He says that the company would put it on if it was needed. Let me say, why don't manufacturers of lower priced cars put on their cars self-starters, shock absorbers, Prest-O-Lite tanks, demountable rims, etc.? I agree with Mr. Warner about an oil gauge. It is a nice thing to have, and it is about impossible to get along without it.

Reply.—The Ford Company have build hundreds of thousands of cars, and our friend may rest assured that they have not nor will not send them out with weak rear axles. Too heavily loaded, rough roads and careless driving is liable to develop something unusual in any car. The adoption of certain accessories or parts is one thing and the making of a well constructed car is quite another. The Ford firm know more about their own cars than any person that lives

and they have spent hundreds of thousands of dollars in perfecting it.

864 Wiring and Switch Plugs.

From Wm. R. McCurdy, Ohio.—We have a Hudson five passenger car, equipped with Bosch high tension magneto, and six dry cells, with vibrator coils, forming a double ignition system. Please inform me through your trouble columns, if there is any way we could wire this engine to run if we should lose the switch plug.

Reply.—You could connect your batteries, coils and timer without the switch, and run on your batteries, or if you were enough of an electrician you could connect your wires in your magneto circuit without having the connection made at the switch. If you think there is any possibility of losing the switch plug a few extra ones would insure you against any possibility of failure to start.

865 Horsepower Formulas.

From Thayer McLaren, New Jersey.—Will you be good enough to advise me in your Trouble Department what is called the English formula for computing horsepower and how is this different from the A. L. A. M.

Reply.—According to our information there is no arbitrary formula in England for computing the horsepower of an internal combustion engine, although usually the length of stroke and the number of revolutions per minute are taken into consideration. The A. L. A. M. rating considers the size of the bore only. Although this may not represent the true power of the engine, it answers well enough for comparison. For illustration: Multiply the square of the bore in inches by the numbers of cylinders and divide the product by the constant $2\frac{1}{2}$.

866 A Red Hot Exhaust Pipe.

From Sherman Salverson, Minnesota.—Please let me know by return mail what is the trouble with my two-cylinder Model D Reo car. The exhaust pipe of the rear cylinder gets red hot. I have the coil and carburetor adjusted as good as I can get them. I run with the batteries which are new and the compression is good. Kindly let me know what is the cause of the exhaust pipe getting red hot and the water boiling. I have a Reo carburetor.

Reply.—Looks as if there were no circulation of water in the jacket of the rear cylinder or that that cylinder is doing all the work. You may have your carburetor adjusted for too much gasoline and run with the spark very late. If your explosions are occurring regularly in both cylinders the temperature of the outside of the jackets of both cylinders should be the same.

867 Wires That Break.

From Leo Rof, Illinois.—I am enclosing a rude drawing to you. The trouble I have is with wires continually breaking off on the timer. I cannot go over timer. Can you think of any way possible that I can fix this so these wires will not break? Or do you know of any kind of wire connections that can be fixed on, thereby preventing breaking? The car that I own is an old Model Ford, and I think that the shaft on which the timer is placed is the cause of the wire breaking, partly because it is bent or something else. I suppose this is called the cam shaft. Do you think

that the shaft is bent or the bearings are worn somewhere in the crank case? I would also ask you if water and oil dropping on the timer affects it in any way. Often times when the car is standing idle gasoline leaks out of the carburetor underneath from a sort of a pin hole which is in the carburetor, where it is fastened to the intake pipe. This is a Schebler carburetor. What purpose does this small pin hole serve and what causes the gasoline to leak out of this hole? This machine is two cylinders and 14 h.p. About how many miles would six dry cell batteries run this machine? Would you advise the use of wet batteries or a storage battery? According to the rating of horsepower, a piston $4\frac{1}{4}$ inches should develop 14 h.p. with two of such cylinders. I cannot find any Ford machines having this horsepower. This machine has the engine underneath the body, water tank under the seat next to the gasoline tank, the gasoline tank holding about five gallons; a compression oiler; radiator in front, three tubes wide and six tubes high; curved dash and steering wheel on the right side. The gasoline control is a foot throttle, spark is lever on steering wheel and the machine has a disk transmission (I suppose planetary type). What model is this car? Please publish your reply in your next issue.

Reply.—Your car is a Ford Model C, and of the vintage of 1903 or 1904, as this early model was marketed both years. It should be no great trouble to tell whether or not your cam shaft is bent, for if such is the case your timer will wobble decidedly, and the only remedy would be to either straighten or renew it. If your wires break from the timer binding posts it is probably due, more than to any other cause, to the fact that you are not using flexible primary wire, using instead a covered wire with a single strand of copper. Almost any garage, supply house or repair shop can furnish you with copper terminals which can be readily attached to the ends of the wires. Oil dropping on the timer should do no harm, but water might cause trouble. The small hole in the carburetor is placed there for a purpose, to prevent "flooding" the cylinders with gasoline. All Schebler carburetors of that model are so constructed unless specific orders are given, that this feature is to be eliminated. No one could possibly tell how far six cells of dry battery would drive your or any other make or type of car. It would depend upon the batteries themselves, the condition of the timer, adjustment of the vibrators and a dozen or more contingencies. If by a rating of 14 h.p. you refer to A. L. A. M. rating, you would be very much out in your calculations. The horsepower rating should take into account bore, length of stroke and speed, which the A. L. A. M. rating does not. You must remember that eight or nine years ago the efficiency of gasoline motors was not as high as today, when a motor of $4\frac{1}{4}$ inches bore and 5 inches stroke, double-cylinder, four-stroke-cycle, at 1,000 r.p.m. would be likely to show approximately $12\frac{1}{2}$ h.p. We cannot recall the length of stroke of this motor, but think it is less than 4 inches.

868 His Reo Touring Car.

From Harold Rutley, California.—1—I drive a 1912 Reo touring car. For starting it is equipped with five dry cells, connected in series. Could this number of cells be connected in multiple, and would there be any advantage? 2—In your answer to A. L. M. (820) you advised him to use his engine as a brake, except on high gear. Would this apply to me? This

method works well and cools the engine, but I should think that the oil which is drawn into the cylinder without being burnt would aid carbon.

Reply.—1—You would not get sufficient voltage to operate your ignition system. It takes at least six volts. Series connection would give you seven and one-half, while multiple would give you but one and one-half, the voltage of but a single cell. 2—It would probably not suck in enough oil during the short time to do any harm, unless the cylinder walls and piston rings were in very bad condition. If you are afraid of carbon deposits as a result of using the motor as a brake, you should never run with the throttle closed nearly, as you would going down hill with the clutch thrown out and the motor running.

869

An Elusive Fault.

From E. B. B., North Carolina.—The car is a 1911 Cadillac, 30, and has two separate ignition systems, the Delco and Bosch magneto. The trouble started in this way: The car had been run about 10,000 miles and had to have a new transmission put in. To make it more clear I will say that there are three repair shops here and this car owner was doing business with the oldest firm and had a man of eight years' experience to do the work. This man was considered about the best in the State. As the transmission had to be ordered, they decided to clean and overhaul the engine, which was done, all valves properly ground and all other parts of the engine put in good condition. It was a good running engine; very flexible; would run very slow on closed throttle, either on batteries or magneto, but faster, of course, on magneto on account of the spark advance. In fact, it was considered about the nicest running engine in town. The engine was reassembled and was started, but it would not run slow as it formerly did. Its slowest speed was almost double what it was before. The carburetor (Schebler Model L) was adjusted to its best running position on the battery, then shifted to the magneto. It would miss on either 1 or 4—sometimes on both. You could then adjust the carburetor to the magneto which required less gasoline. It was then shifted back to the battery; it would miss on 1 or 4; sometimes on both but with very best carburetor adjustment it would only miss on one at a time. This is for low throttle. The throttle could be opened just a little with the adjusting screw so it would run a pretty good speed, so that if it was in high gear at that speed it would be going about 25 to 30 miles an hour. With the carburetor adjusted to this speed for both gasoline and air, it would not miss either on battery or magneto. It was the advance of the spark that seemed to do the trick. They could not adjust the carburetor to a position that would suit both retarded and advanced spark or both battery and magneto, which had the same effect. Now from the above you would say it was all in the carburetor, but a new Stromberg was put in and all the conditions were just the same. The valve stems and guides were worn a great deal but new stems were made to fit the guides. The rings were in apparently fine shape but new ones were put in. The compression was good as it was before. However, all of no benefit. The timing has not been changed in any way, and there are positively no air locks about the carburetor or intake pipe. The gasoline feeds free and there is no entrapped air in the pipe. The ignition works fine; it always sparks whether the cylinders fire or not, and the Delco system works the same on all the cylinders if the wir-

ing is good. The trouble is not in the plugs. It gets the same amount of oil it did before and the same oil. Heavier oil has been tried. It could not be in the ignition as it works exactly the same on both systems. You can depend on it that about every imaginable remedy and adjustment has been tried, but it appears to have just lost its "rabbit's foot." The engine never heats even when missing, and with it adjusted to the best running position, either on battery or magneto, it has all kinds of power and speed. But there is no point of carburetor adjustment that will suit both. The man who did the overhauling gave it up and said it couldn't be fixed. It was then brought to me. I spent several days and nights and the only thing I could say was that I didn't fail any worse than the other man, so the third repair man tried it and it did no good.

Reply.—It looks to us as if the valve stems were made too close a fit and that they are sticking slightly in their guides. In assembling valve springs unless great care is observed one is liable to slightly bend the valve stems. For very best results the holes through the guides should be .005 of an inch larger than the valve stems. From your description of the condition of the two separate ignition systems, it seems to us that they are working properly, and that there is no trouble with the carburetion. You also claim that your compression is good. If your inlet valve stems stick you will get a blow back through the carburetor, and if the exhaust valves stick, you can only locate the trouble by taking them out and examining them. To prove that the trouble is surely in No. 1 and No. 4 cylinders, change the plugs for those in Nos. 2 and 3. If Nos. 1 and 4 continue to give trouble, it shows that it is either in the ignition or valves, and by elimination you have apparently proved out the ignition. Please let us know how you find the valve stems in Nos. 1 and 4 cylinders.

870

Steering Wheel and Timing.

From R. H. Cole, New York.—I have a Ford touring car and note a rattle between the steering wheel and ball and socket connection on the steering post. The two rods that run parallel with steering post are loose, but I am not able to tighten them. Can you give me some pointers in regard to timing valves? I would like to pass the examination for chauffeur.

Reply.—If no means are provided for tightening it further, it will be necessary to purchase new parts to replace worn ones. In regard to the timing of the valves, no two manufacturers use exactly the same methods, but ordinarily exhaust valves should open considerably before the end of the power stroke, and close very closely to the end of the exhaust stroke. Inlet valves should open after the exhaust valves close and close anywhere from the end of the induction or inlet stroke to ten degrees after.

871

An Occasional Back Kick.

From Wm. H. Bromhead, Massachusetts.—When you run your car, say twenty miles and then stop for a little while, say ten minutes, and then go to crank up and with the spark retarded and you get a back kick, what is the trouble? Under other conditions the engine starts all right, and sometimes under these conditions, but I can never tell when, after making a run of twenty miles and then stopping and then starting the engine, whether it will be all right or not. Some-

times it is all right and again it gives a back kick. Can you tell me what is wrong?

Reply.—We cannot, from reading your question. It would have been much better for you to have mentioned the name and model of your car, if you confidently expected any definite assistance. All we can say is that you apparently do not really retard your spark every time you put the lever in its retarded position, unless your ignition is make-and-break and you do not crank completely past the center. We are more than willing to answer inquiries but cannot make intelligent replies unless questions are put in intelligent form with at least some detail. We trust you may do better next time.

872 **Lamp Trouble.**

From M. Juline, Ohio.—On my Model 54 Rambler touring car I have large Solar lamps with 7-inch reflectors usually used on their Model 55 Ramblers, but have been unable to get the proper light from these lamps. The gas tank is in the back of the car, have had the line tested several times and found that O. K., also had burners changed; use half foot burners. Could you tell me how to get better results?

Reply.—On communicating with the Solar lamp manufacturers here in New York, the Badger Brass Manufacturing Company, they courteously state that the lamps referred to are probably Model No. 957 R lamp, made for the Rambler Company. They cannot understand why these lamps are not proving satisfactory and suggest that the lamps be returned to them, Eleventh avenue, 36th and 37th streets, and they will put them in first-class condition without charge. They say it may be that the lamps are out of focus or perhaps the tips have been changed.

873 **Troublesome Carbon.**

From W. V. Moore, Virginia.—I drive a 1911 Ford Model T touring car, fitted with an Air Friction carburetor, the Ford timer and a Jacobson-Brandow coil with four vibrators. About a week ago without any apparent cause my motor started missing dreadfully, sometimes all cylinders ceasing to fire. The missing would occur for distances ranging from a few yards to a quarter of a mile and then all at once she would work perfectly with plenty of power and every cylinder firing properly. Thinking that the trouble was due to carbon, I took off the top of my engine and scraped the cylinder heads and explosion chambers and spark plugs. I adjusted the vibrators and the carburetor seems all right, for she runs fine when all cylinders fire. I took off the carburetor, however, thinking there was perhaps water in it and though I found some, the engine ran no better after putting it back on. The miss will occur in one cylinder or one pair for awhile and then those will fire and the other pair will miss. Sometimes the engine runs perfectly in the garage but as soon as I get it out, it will miss, then it will pull finely and fire all right when under load but will skip and miss badly when running idle. I hope that you can suggest my trouble. All my vibrators work apparently all O. K. and I can get a spark from either end of all of my plugs, yet the missing continues. I will be greatly obliged if you will tell me how to remedy my trouble.

Reply.—This is not an infrequent condition, and is due, no doubt, to the accumulation of carbonized hairy particles of fibre which collect on the magneto terminal spring on the top of the casing over the combined magneto and fly wheel. Vibrators used

with this model of car should not be adjusted too closely, as the high voltage of the current on high motor speed is likely to fuse the contact points in the vibrators.

874 **A Good Deal of Trouble.**

From E. N. Whitcomb, Pennsylvania.—I have a 1906, Model G, Franklin air-cooled five-passenger car, purchased second-hand last fall. When I got the car all the cylinders seemed to have very good compression, except No. 2, which was not quite so good as the rest. Whenever the engine was running light, cylinder No. 1 did all the work. Nos. 2 and 3 did some work when running on the road, but No. 4 would not even get hot. The insulation was gone on some of the wires, and during the winter I have re-wired the car and reset the valves and timed the ignition in accordance with instructions obtained from the Franklin people. I also cleaned the contacts and adjusted the coils as per directions. Each one of the bank of batteries will test over five amperes. A good spark is always obtained at the secondary when contact is made at the primary of any coil. The vibrators have a high-pitched buzz and very little movement. After re-adjusting the timing, etc., I had a little difficulty in starting the engine, as it was very cold, but when it did start, cylinder No. 4, which refused to run last fall, did all the work. Each time, after the car has stood a few days, when I get the engine started, one cylinder does all the work and the one which fires one revolution from it, does not get hot. The cylinders seem to take turns running the engine, and all four have had their turn. The engine will not run slow. While running light, and especially if I try to throttle down a little, it skips some and muffler explosions are very frequent. Sometimes it will nearly stop, and then suddenly pick up and go very fast. If I shut off the gasoline a little with the needle valve, it skips badly and explodes in the muffler. Then when I open the valve a little again, the four cylinders sometimes take hold and the engine gains a high speed at once, but immediately one cylinder is doing most of the work again. More gasoline only causes smoke. Changing coils, wires and spark plugs had no effect. I am using automobile gasoline, purchased from Standard Oil Company. Very often I am unable to start, especially in cold weather, and have to get a gallon of gasoline from a local store to start with. My gasoline is in an air-tight tank, above ground, under an open shed. The carburetor never floods, but depressing the float a very little causes a few drops to overflow the nozzle and drip down on the air valves. The engine will start without much difficulty after it is hot. When running on the road, the power is very poor and the engine not easy to control. As this country is very hilly, I have to use low and intermediate speeds very much.

1. Is the carburetor the cause of the trouble?
2. Might my gasoline be at fault? The gasoline from the store starts the engine a little easier, but does not run it satisfactorily.
3. Could the ignition be at fault?
4. Could the rather poor compression in cylinder No. 2 be the cause? This cylinder sometimes gets the hottest and does most all the work.
5. Would a new carburetor help? If so, can you recommend the "Schebler" Model "L" or "F"?

Reply.—Your batteries are exhausted. They should test 20 to 25 amperes when new, and will not be very serviceable when they show less than 10 amperes

each. The exhaustion of the batteries is conclusively proven also from the necessity of close adjustment of the vibrator contacts to get any cylinder to ignite. Too close adjustment of vibrators is ruinous to batteries. We think that the above answers your entire five questions. It is barely possible that a coil six years old, and vibrators that have not been renewed during that time may have outlived their period of usefulness. You should not expect an air-cooled motor six years old to run as satisfactorily as one of later vintage. We do not see how a carburetor could improve your ignition, and if you can get one cylinder to explode regularly it shows that the carburetion must be fairly efficient as the cylinders in which explosions do not occur get the same amount and quality of gas as the one that explodes regularly. The explosions in the muffler show also that the ignition is at fault.

875 That Troublesome Grease.

From D. Huber, V. S., Indiana.—I have had a little trouble with my car and would like you to solve it through the columns of your next issue. I have a 40 h.p. Overland car, 1911 model, and have had quite a great amount of trouble from grease working its way out of the transmission into the differential and thence into the brakes. I hardly think the cause could come from wear as the car has not been driven over 3,000 miles.

Reply.—If the trouble is caused by worn bushings there is but one remedy, renewing worn parts; if from overheating of the parts due to imperfect alignment the cause will have to be removed; if the oil or grease is too thin you should use a lubricant of greater consistency. If your gears and bearings heat up it shows probably poor alignment, possibly the bevel gears not running on their pitch lines, shafts sprung or some such condition as that. The heating up of the lubricant from excessive friction would naturally force grease out of all the bushings, as the volume of oil or grease increases from heat. If your gear case gets inordinately hot from running it needs attention, but it is our opinion that the trouble is a result of worn bushings which would affect the alignment. It is advised by some to provide a vent for the relief of the hot air and oil vapors, but such an expedient to our mind should not be necessary.

876 Towing a Car.

From Ralph Bostwick, Ohio.—Would you kindly state how to tow another car, whether to hitch the rope around the differential housing or elsewhere?

Reply.—The rope should preferably be tied to the chassis frame of the towing car, using a bridle or a single part to each corner if possible.

877 Wants to Use Natural Gas.

From J. W. George, Texas.—We have a 6 h.p. I. H. C. gasoline engine which we have run for the past six years on naphtha. This town is now installing natural gas and I want instructions for changing it so it will use gas. Would like to have it so either fuel could be used. Of course I could order the parts from the factory but that will cost about \$20. Suppose gas was piped to the present intake valve would it not work through the same needle valve? The engine has a small gasoline well with needle valve. It sucks the gasoline and air in just like any other carburetor.

Reply.—You could not get sufficient gas through

the gasoline piping, and there would be nothing to prevent the gas from flowing all the time, due to its pressure or head. Your only remedy is to buy the separate gas mixer or construct one yourself. You must have a spring loaded or weighted check valve in your gas line to prevent the gas from escaping when not taking it into the cylinder, as this valve is lifted off its seat, with an auxiliary air supply between this valve and the motor with a T connection and a gas cock or valve for adjustment. If you should equip this motor with some contrivance of your own and you should by any means have a fire, you could not collect for loss unless the mixer were passed by the National Board of Fire Underwriters, which would cost you several times \$20. If you are not carrying any fire insurance be sure and take out a life or accident policy, unless you know what you are doing.

878 Glidden Tour and the Krit Car.

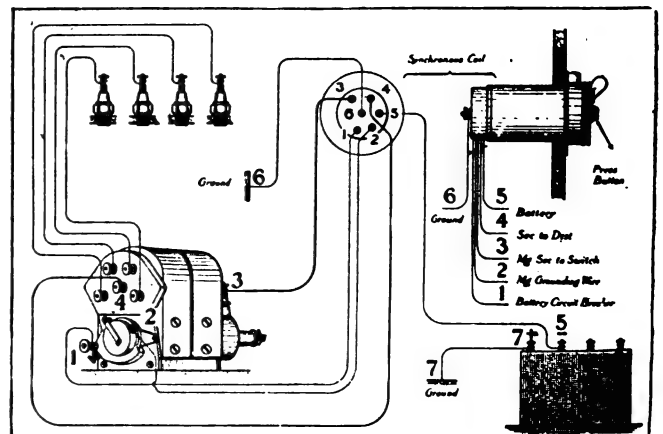
From Dr. S. H. Keller, New York.—Will you kindly state the distance of the 1911 Glidden Tour, number and kinds of cars entered and their order and scores at the finish. Is the Krit car an assembled car or is it built entirely in the factory of the manufacturers?

Reply.—The distance of the Glidden Tour was 1,454 miles, the number of competitors was 64, and the winner was the Maxwell car. The Krit car is not an assembled car. The manufacturers have a factory at Detroit, Mich. Quite likely the firm buys some parts and accessories, as is the case with practically all manufacturers, but the car has a large manufacturing as well as an assembling plant and it has behind it substantial business men.

879 Wiring for the Bosch Dual System.

From F. Q. Berdine, West Virginia.—I have a 1912 Krit touring car and would like to know how to wire it for the dual system.

Reply.—Standard equipment for the 1912 Krit is



Bosch high tension ignition, although on special order Bosch dual will be furnished, of course at an added expense. The only way we know to equip your car with dual ignition is to have the magneto built over to the dual type by the Bosch Magneto Company, who will furnish you with a transformer coil for use with batteries, and all the necessary cables (of different colors) and full instructions for connecting. It is our opinion, however, that the "ground" wire will not be included. It may be that instead of dual ignition you desire double ignition, a system entirely independent of the magneto system. This would necessitate some means for driving a timer or combined timer and distributor from the cam shaft, and an additional

set of spark plugs. The Bosch dual system uses but a single set of plugs. To wire for the dual system you will first have to secure a dual magneto or have your present independent type built over. The diagram is taken from the Bosch catalogue.

The heavy lines 3 and 4 represent high tension or secondary wiring, while the light lines 1, 2, 5, 6 and 7 represent low tension or primary. No. 1 connects the battery timer with the combined synchronous coil and switch, which is to be attached to the dashboard; No. 2 connects the magneto interrupter with No. 2 binding post on the switch and coil; No. 3 leads the high tension current from the magneto to the switch, where it may be "grounded" in "off" or "battery" positions; No. 4 leads the high tension current from the coil, where it is induced by the low tension current from the battery, to the distributor; No. 5 connects the battery with the primary wiring of the coil and switch; No. 6 is a ground wire, leading from the coil and switch to short circuit the high tension magneto current through No. 3 when the switch is in the "battery" or "off" positions, and No. 7 is the battery ground wire leading from the positive terminal of the battery. Dry cells may be used if desired. With the dual system there are thus four wires connecting the magneto and switch, and but one in the independent system.

Valve Adjustment.

From T. A. Peck, Abbott Motor Company.—A great many car owners make a practice of adjusting valves while the motor is hot. This is an error. It is proper to note any abnormal condition like this, but wait until the engine is cold. If this suggestion is not heeded, particularly with motors of overhead valve design, the adjustment will be inaccurate, valves will not seat properly, resulting in weak compression.

An adjustment too tight on the intake valve or too loose on the exhaust valve permits the fuel to escape, thus reducing the compression and diminishing the power.

An adjustment too loose on intake valve also reduces the compression by shortening the length of the compression stroke. The exhaust valve under loose adjustment opens late. This retards the engine action as the exploded gases do not have prompt exit and a portion of the power intended for compression stroke is wasted in recompressing dead fuel.

There are four cylinders, each requiring equal exactitude of adjustment to keep the valves of one cylinder from overlapping those of another. That is one reason why an engine throbs, lunges, misses, backfires and lays down on a hill.

Examine the valves at regular intervals, even though the compression is apparently normal and uniform in each cylinder. The exhaust valves are especially susceptible to corrosion on account of the intense heat of the escaping gases. The seats soon become pitted, the carbon dust and vapor is caught and confined in every little crevice and in an incredibly short space of time the valves, if neglected, will be covered with a deposit of carbon which will affect the running of the motor to a marked degree. The only remedy is to grind them.

There are several good grinding compounds on the market. It is advisable to use a coarse grade in the first operation and then finish off with a finer one to impart a nicely polished surface. A very good home-made mixture is obtained by making a thin paste of a couple of teaspoonfuls of kerosene, a few drops of oil

and enough fine flour emery to thicken the preparation to a consistency where it will not run too freely.

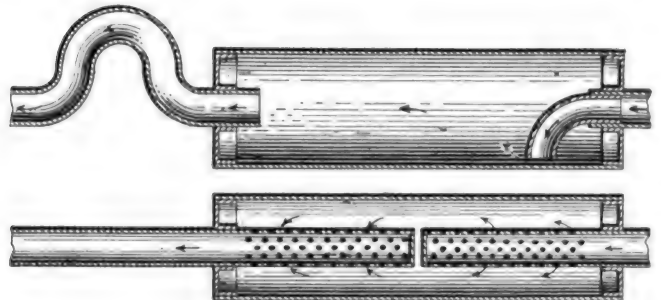
Remember even the minutest particle of this grinding abrasive must be kept from finding its way into the combustion chambers. Pack a good, generous quantity of waste or rags well soaked in gasoline around the valve seat.

Apply a moderate coating of the compound to the bevel face of the valve and return it to its seat. Rotate the valve forward and back until the entire bearing surfaces are polished bright and smooth the full width of the face. If the guide is worn or the stem bent care must be exercised or the valve will not be true, that is, the bevel face will not be flat but a trifle convex. The valve should never be turned the whole way round. Rotate it back and forth a quarter turn at most under light pressure, lifting it up frequently and turning it half way round before seating it again. This method distributes the friction evenly.

After working up a good, clean seat entirely free from spots or pits, wash the valve, valve seat and guide thoroughly in gasoline. If the stem is rough or gummy, smooth it up with emery cloth and clean it afterwards before replacing it in the guide. To test the effectiveness of the work, mark the valve seat in several places with a lead pencil and turn the valve around a few times. If the marks are entirely rubbed off, the work may be considered well done.

Choked Mufflers.

A reader asks how to clean his muffler pipes. In the case of a design like the top of the illustration, the arrangement of the inlet and outlet pipes were



changed so they took the form shown in the bottom view where the inlet pipe from the engine enters the muffler with a sharp bend upward. The exit pipe has a double bend as shown. In this case, the results were far better than expected, for not only was the engine distinctly more efficient but the exhaust was just as quiet as before the change was made.

Freezing Batteries.

From E. E. Marrs, Vermont.—I notice a subscriber writes in regard to his batteries freezing up. I have had lots of trouble with them the past winter. Nobody in this locality had ever before heard of such a thing and they said it was because they had run down. But I got a new set and they did the same thing. This proved that they would freeze all right, but I find they will come to life again but they do not last long.

Fiber washers should never be used in the fuel line or in any part of the motor where gasoline in its liquid state is liable to rest upon them. The action of the gasoline upon the fiber washer has a tendency to make the motor run sluggishly by forming a deposit, and lead washers should always be used.

The Repainting Question.

From T. F. Murphy, Ohio.—I want to criticize the article written by Nemo in your April issue. I am inclined to believe that the writer would endeavor to teach the car owner by mail. He suggests that any dents in the surface of hood and fender should be removed; he also suggests that the paint be burnt off of the hood. The writer does not think that it would be advisable to make these suggestions to car owners as his advice involves entirely two different trades, namely sheet metal work and painting.

I have noted particularly that he is not attempting to outline a course for professional painters but only to call attention to a few things that the average car owner who wishes to improve the appearance of his car perhaps has not had any opportunities to learn. Now, I will give the above paragraph all the significance it conveys but after further pursuance of the article I find that he suggests that the amateur must use good material and first class brushes, and the room must be warm and clean.

Now, honestly don't you think it would be cheaper for the owner to take his car to a paint shop and have it finished right, instead of investing his money in colors, varnishes, white lead, steel wool, sand paper, japan, turpentine, dry white lead, gasoline torch, and a mallet and other things? Good varnish cost about \$3.00 a gallon, first class brushes from 60 cents to \$1.50.

And the highest art of painting is in laying the varnish. This can be done by a first class painter only and not by an intelligent amateur. And last of all, who is going to do the striping?

(Note by the Editor.—Replying to our friend, it may be stated that "Nemo" had nothing to gain by his candid and impartial view of the repainting matter, which grew out of practical experience. The tone of his article was admirable and his reasoning clear and plausible. As to whether it would be cheaper for the owner to paint his car himself or take it to the paint shop, depends very much upon his own care and skill, the value of his time, and upon the kind of work that would be satisfactory to him. This of course leads to the conclusion that in some cases repainting by the owner would be advisable and in others it wouldn't. As to the striping, with the "present tendency to quiet and harmonious effects" referred to by "Nemo," quite likely some car owners of limited means and modest taste might not require it.)

The Buick Motor Knock.

From Nemo, Nebraska.—C. E. Little, Nebraska, is troubled by a knock in the motor of his Model 14 Buick. A similar case came to the attention of the writer some time ago where a Model 14 misbehaved exactly as Mr. Little describes. The bearings were renewed and carefully adjusted, but the trouble still continued. It was finally located in the universal joint bolted to the hub of the fly wheel and which connects the motor and propeller shaft. This joint has a square end socket in which is fitted a sleeve which is in turn slipped over the feathered end of the propeller shaft. The end of the universal joint and the sleeve had worn very much and as the propeller shaft runs at an angle to the crank shaft, at every revolution of the engine the loose end of joint would slap and pound. When new parts were substituted, the noise vanished.

The Model 14 is very liable to knock if there is

the least looseness in the main crank shaft bearing, between the cranks and flywheel. The owner may think the bearing is all right on account of the difficulty of testing for looseness. By resting a strong iron bar over the top of the crank case alongside of the magneto base and putting the end under the rim of the fly wheel, by bearing down on outer end, the least slack will be apparent.

From the construction of this bearing at the factory, no adjustment can be made without some change. This is caused by the fact that not only are the upper and lower halves of bearing bolted together in the usual manner, but also have semi-circular plates cast on the ends for closing the opening in the crank case after the crank case is inserted. These plates being bolted rigidly to the sides of the crank case, make it impossible to draw the two halves of the boxing together for the purpose of taking up the play. To remedy, take a round file and elongate the holes in the plates, so there will be enough movement of the plates to allow the box being tightened. Be careful that all the holes are enlarged in the same direction, or no sliding motion of the plates can take place.

Wants To Know About Things.

From O. H. Hampton, Indiana.—In your reply to 838 in the April number, you seem to have it in for double opposed motors. You say, "It is almost impossible in double-opposed motors to get the right mixture in both cylinders. One will be too rich and the other too poor. The back fire comes usually from the cylinder with the too poor a mixture, and the missing from too much gasoline."

Please explain why if both cylinders are in perfectly good order, and in all respects exactly alike, the air intake pipes from carburetor to cylinders exactly alike, and the carburetor in perfect order can there be any difference in the mixtures delivered to the cylinders? In theory would it not be impossible for the mixture delivered to one cylinder to be different from the mixture delivered to the other cylinder?

You say "the back fire comes usually from the cylinder with the too poor a mixture." What difference could the too poor a mixture make with the backfiring?

How is it possible for backfiring to occur at all if the intake valve is tightly closed during the full period of the explosion stroke? Is it possible for any backfire to take place when the valve is closed gas tight?

Did it ever occur to you that backfires may occur during or nearly at the end of the exhaust stroke? This possibility is generally overlooked in considering the cause of backfiring, but it is a fact that if the intake valve is timed so it opens before the completion of the exhaust stroke, a part of the hot exhaust gas will be forced into the intake pipe and fire the gases in the pipe. The gas in the intake pipe may or may not be fired under these conditions. If it fires it is a backfire; if it does not fire it is a blow back.

Either backfires or blow backs will affect the quantity and the quality of the next charge taken into the cylinder from which the backfire came, because the backfire leaves the intake pipe and the carburetor filled with exploded gas instead of a proper mixture.

There is a reason for the unequal mixtures in two-cylinder opposed motors that has apparently been overlooked; at least the writer has never heard it mentioned. Many of these motors have, theoretically at least, an air-tight crank case. The pistons alter-

nately approach and recede from each other; as they approach each other there is a considerable degree of compression in the crank case. If the pistons do not leak, this would not affect the case at all, but as a rule, they do leak, and generally one leaks more than the other one. On the suction or intake stroke of the piston there is a vacuum in the cylinder behind the moving piston, and air tries to get into the vacuum from everywhere, both from the intake pipe and around the piston from the crank case, and as the pistons are at this moment approaching each other there is pressure in the crank case assisting the suction that is trying to get into the vacuum from the crank case. It is plain that the mixture in the cylinder will be richer or poorer in proportion to the tightness or leakiness of the piston, and if one piston leaks more than the other one the mixture in the two cylinders will not be alike.

It is true that leakiness affects the quality of the mixture in any cylinder, but not to so great an extent in motors of the four-cylinder type, because they are provided with "breathing holes" which prevent compression of air in the crank case.

The Leaking Axle.

From Nemo, Nebraska.—Joseph Riendl, Wisconsin, is annoyed because his Ford leaks grease out on the rear wheels. This is a common trouble with all makes of machines and no amount of new felt washers will stop it, for in a few days the washers become saturated and the matter is as bad as ever. The sure remedy is to bore one, two or more holes in the bottom of the axle housing next to the outer bearing and let the surplus grease escape. Holes may be $\frac{1}{4}$ or $\frac{5}{16}$ inch. If no geared breast drill is available, a common bit brace may be used by cutting a hemispherical pocket in a piece of board for the head of the brace to rest in, raising the axle of the machine with a jack so that with the head of the brace resting in the pocket of the board placed on the floor, the point of the bit will just touch axle housing and gradually lowering jack so as to bring pressure on bit as boring progresses. These holes are a sure cure for the nuisance.

Who Can Beat This?

From W. W. Jennings, Pennsylvania.—I note in your April number a communication from a veteran car user, seventy-six years old who runs a runabout car in the level State of Illinois. I don't wish to brag but I commenced to run an Olds runabout in 1903. I was then past seventy-four years old. I have owned four different cars since, a Reo, a Matheson and a Locomobile and I now have a Sears-Roebuck. I have run all of these cars except one. I have run my present car from Wilkes-Barre to Towanda, which is about seventy-five miles, right in the Allegheny Mountains. I have been to Stroudsburg and back, which is over the Pocono Mountains, as rough woody and wild a section of country as can be found this side of the Rockies. I not only drive an automobile but I ride a bicycle nearly every pleasant day during the summer. I was eighty-three years old last March.

Spongy Vulcanized Rubber.

From C. A. Shaler & Co., Wisconsin.—A few days ago we happened to note query No. 842 regarding vulcanizing. We might supplement the reply given to that question by adding that a porous repair, while quite frequently caused by overheating, due to the

lack of vigilance on the part of an operator using a vulcanizer without a temperature control which is automatic, some times results from another cause. When one is vulcanizing and neglects to give the cement sufficient time to dry before applying the vulcanizer the gasoline in the cement evaporates on the application of the hot vulcanizer and forces its way to the surface leaving the spongy condition which has been noted by Mr. Wyman.

Two Faults Easily Cured.

From E. C. McC., New Jersey.—My 1912 Ford T touring car had two faults which I cured as follows: For a grinding noise which only developed when running between 25 and 30 miles per hour, as recommended by one of your readers, I had a brace or tie rod fitted under the rear axle to stiffen up the differential casing. This is probably a good thing but it did not cure the grinding noise. I jacked up the rear axle and ran the engine on "high." Holding a short piece of wood between my ear and the differential case I heard quite a grinding noise inside the case, though without the wood the car seemed to be running smoothly enough. I then put it up to the Ford agent and his repair man recommended a new driving gear. I took out the old gear and replaced it with the new one. The car now runs at all speeds without a murmur. Although the car had run only 1,200 miles the old drive gear showed signs of wear, especially on one or two teeth which were quite soft. These gears were not made by the Ford people but by the Dodge Manufacturing Company, as their name is stamped on the gear.

Another fault was in the foot brake, which always brought the car to a standstill with a great shudder or shake. These brake bands are lined with Raybestos as are the "low" and "reverse." I took them out and found that they had worn smooth though not thin. I scraped them well with a knife so as to rough up the surface and on replacing them found that they all acted quite smoothly. To take out these bands it is necessary to lift off the upper casing over the transmission. Care should be taken to allow nothing to drop in the transmission. I spent two hours fishing for a washer, which I finally forced down into the oil well. I got it out by passing a thin wire with a bent end up through the oil plug hole and catching it on the washer, pulled it out.

The Brush Misfire and Spark Plugs.

From C. S. Peet, Iowa.—In the March number of your paper on page 43 under Trouble Department, No. 804, from Roy Jones, Iowa, stating his trouble with a Brush car: I have a Model B. C. Brush car bought in 1909, and after I had run it about three months, it commenced to act just as he describes his did, and I did everything that he says he did and tried several different makes of spark plugs, with no success. I broke a spark plug and I happened to buy an A. C. plug, and it worked perfect again. If I put in a different make of spark plug now it will act the same again. It might be that an A. C. plug would not stop his troubles, but if he will keep changing plugs, the chances are that he will find one that will work all right.

Good Advice to Drivers.

From W. H. Sharp, M. D., Ohio.—I have driven my car 17,000 miles. By being careless, I got out of oil and run the cylinders dry two or three times and

finally damaged the rings so I had to have new ones in. Then I put lots of coal oil in and spoiled my compression by cutting all oil out from around rings. I have found out I am getting better compression by using heavy oil. I also had a good deal of trouble since the rings were put in, having no power on account of poor compression. Finally on close looking I found that the garage man had missed it one tooth in timing of valves, so now it is working good. I believe if a man uses enough oil, gasoline and water, starts and stops carefully, picks his road and keeps his tires up to proper pressure, that he should have very little trouble.

A Good Word for Tire Treads.

From George Kiltz, Illinois.—I see that an inquiry is made about tire protectors. I wish to give my experience with a pair of Woodworth treads. I bought a pair of Woodworth treads about two years ago. I put them on the rear wheels of a car weighing a little over 2,000 pounds. The tires and the inner tubes were of a poor quality. After running the car some time with the treads on, I had several ruptures in the inner tubes, which I attribute to heating. That is what people told me the treads would do. So I took them off again, but I was in just as bad a fix as before, and worse. Now those inner tubes were new ones, but they went all to pieces. They were worse than useless, for they tormented me all the season.

If you want lots of trouble with tires, just get some cheap inner tubes and you can have it to your heart's content. I care not how good your casings are, if you have poor inner tubes, you will have lots of trouble. This experience with cheap tires and tubes wholly revolutionized my feelings, so I bought good tires and tubes and put on my treads again, and since then I have not had the least trouble. As for the treads overheating the inner tubes, I will say I experimented with them both. I ran the car with the treads off for eight or ten miles, which was long enough for it to heat, for after that distance the air radiates the heat. I found that the pressure increased five pounds to the square inch. This was the highest pressure I got on that run. This I tried several times. In putting on the treads, I found no greater pressure, so I found the theory a fake. I see no reason why a tire should heat any more with the tread on than off, for the tire does not come in contact with the gritty earth; no scraping and slipping off cobblestones or gravel. It has been said they make more dust. Now we know that a pneumatic tire raises its dust by the suction it has. It flattens on the ground, forcing all air from beneath, causing a whirl of air in the rear of the tires. Now with a good studded tread there is not the chance for the tire to have that suction, for the studs keep the tire off the hard surface so air can pass under the tread and not have that strong suction. When a tire that has no tread on strikes a stone it has a chance to break the rubber from the canvas causing sand blisters, which are death to a tire. When a tire comes in contact with a stone buried in the road, it has a scraping motion which loosens the rubber from the canvas. This is all avoided with the treads. Glass and sharp stones cut the rubber and quite frequently cut the canvas also, causing blowouts, none of which occurs with a good tread. You can keep your tires pumped up harder with much less danger of blowouts and run easier.

As for a car running harder with a tread, I at least have found no difference. If any difference it would

be in its favor. For my part, I cannot see why people are so afraid of tire protectors. After a car has run about one year or less you can see any amount of hacked, gashed and blistered tires, and yet people cry that the treads spoil the rubber. Let one such just run a car for one year with protectors, and then take them off, and see how slick the tire is; not a scratch on the rubber.

I would like to ask what is being done with our license money? We would like some of it for our bad roads.

Mr. Hampton on Knocking.

From O. H. Hampton, Indiana.—I wonder if "Reader," Rhode Island, has found that mysterious knock he referred to in a former issue.

From his description it is a pretty good guess that the knocking is caused by pre-ignition, and from the fact that the knocking does not occur when going up or down hill, it is another good guess that the trouble is on account of a disordered timer. It is possible, though not very probable, that the timer has slipped a little on the cam shaft, or it may be that some part of the timer is worn so the contact is not made at the right time. It will do no harm to take the plate or cover off the timer and watch it while turning the motor slowly to see if it times the ignition at the proper time, and if it is found to be out of order have it put in order or get a new one.

Of course it may be that the knock is caused by lost motion somewhere in the interior of the motor, and it is well enough to remember that there are two kinds of lost motion that will cause knocking. Sometimes the crank shaft or the cam shaft may have lost motion endwise, and this sort of lost motion is very apt to be overlooked.

If the piston pin end of the connecting rod does not quite cover all the space on the pin between the lugs that hold the pin in place, the connecting rod bearing will slide back and forth at each revolution and knock the ends of the bushing against the lugs. If the vehicle be going up hill or down hill gravity might keep the end of the bushing resting against the down hill lug and there would then be no knocking, but on level ground gravity would have no effect on it and the bushing would be free to slide against a lug at each thrust of the piston.

Of course there is the possibility of a worn bearing somewhere, but if that is the trouble, it is difficult to see how going up or down hill could make a difference. The reply to "Reader" says that "coils can cause knocks from poor adjustment of the vibrators, upsetting the synchronism of the ignition." This certainly is a "new one" to me. As I understand it the coil cannot transmit current to the spark plug without vibrating, and it cannot vibrate unless the timer is making a contact.

It is easily understood that a vibrator may be out of adjustment so it will not vibrate regularly or perhaps not at all, but that it should vibrate at the wrong time if the timer makes contact at the right time is beyond me.

Effect of Cold on Dry Cells.

From O. H. Hampton, Indiana.—During the severe cold winter the writer tested some dry cells that had been exposed to below zero temperature for more than a week. They averaged 10; they were then put in a room warmed to 65 degrees and after they were warmed to the temperature of the room they aver-

aged a little better than 15. Moral: If your dry cells appear to be about dead in very cold weather, don't throw them away but put them in a warm room.

If you don't know much about your car and it doesn't go to suit you, and you propose to "monkey" with it to see if you can help it, you can do so with a reasonable degree of safety, if, before you make any change in adjustment or take anything apart, you carefully note its exact position; then, if your changes have helped the trouble, let them remain, but if you have made things worse, you can put things back as they were; and no harm is done. If this rule is not observed, things are liable to get mixed up so the last state will be worse than the first.

A Good Ford Record.

From Dr. S. A. Stokes, Maryland.—Noticing several reported Ford records in your publication, I am tempted to give you mine: My Ford runabout, Model S, No. 1625, 1908, was bought in October of that year after several months use by a dealer. It has been in uninterrupted use in a country practice to date. I have never broken anything of importance sufficient to lay it up; never has been to the repair shop. I have been able to make all replacements and repairs myself. I overhaul and inspect during February or March, when the dirt roads are impassable, aiming to stop rattles and knocks as they mean looseness and wear. Replacements have been trifling, and the machine is still running good. In the spring of 1909 I installed a Hercules "Wizard" magneto which also is still on the job. Out and back has been the rule.

Leaking Differential Grease.

From E. E. Porrish, Missouri.—In answer to Joseph Riendl, Wisconsin, in the March number, in regard to his Model T Ford leaking differential grease out into the brake drum on the right side of the car, will say that I have had the same trouble as have also several other Ford owners in this part of the country. The remedy for such a nuisance is as follows: Bore a $\frac{1}{8}$ inch or $\frac{1}{4}$ inch hole under and through the rear axle about half way between the differential box and the drum and use a little heavier grease and his trouble will be eliminated. This lets the thin grease escape that would eventually work its way out into the brake drum. Why it always attacks the right side I am unable to say, but this is the side that has given the most trouble to Ford owners in these parts.

Ignorance and Graft.

From J. B. Wilson, California.—Among the two most flagrant wrongs of the automobile owner are the ignorance of those who set themselves up as experts in repairing and the graft of those to whom we have to submit. These added together cost an enormous sum which must be borne until car owners rise up and refuse to be any longer swindled. My car has been a bill of expense, although my friends who have other cars know better, have many of them been entirely exempt from repair bills. My experience has been so unfortunate that had I known it was coming, I never would have owned an automobile.

For Brush Car Owners.

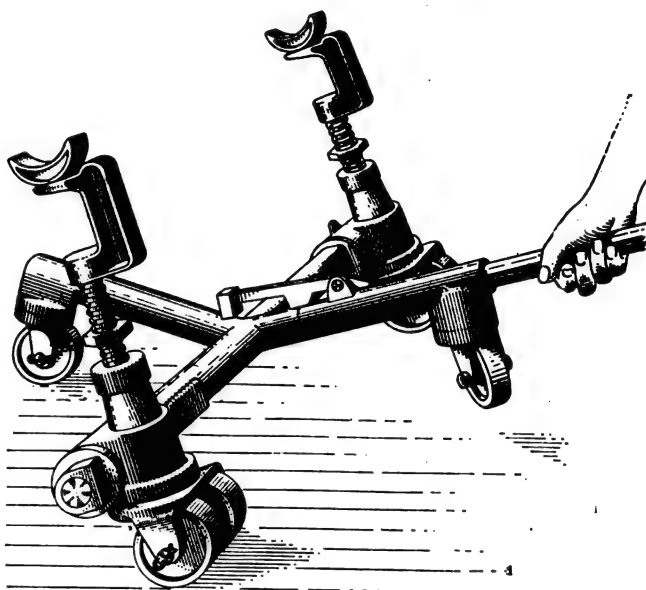
From Garrett Dyer, Kansas.—Please tell all owners of Brush cars to take off the suction or intake pipe and bore a hole about half way between the carburetor and cylinder and screw in an air valve; a common priming cup is best. After the motor is running at a good rate

of speed, open the valve on the priming cap. This not only saves gasoline, but the air being sucked in, more thoroughly mixes and vaporizes the gasoline, and the machine will give better results.

A Turntable and Lifter.

From O. H. Ames, Pennsylvania.—I am now using my third car and with one exception, when I had a broken part and away from home, I yet have the first time to take my car into a repair shop for any adjustments or repairs, always having cared for and driven my own car, for which credit is due to a great extent to help received from automobile publications.

In the March issue I note the lengthy article on garage turn tables by James F. Hobart, also the turntable truck made by Mr. C. D. Oldknow. This truck looks to me like rather a cumbersome contrivance, and even with the improvements suggested by Mr.



Combined Turntable and Lifter.

Hobart, it would be quite expensive to construct and a crude affair at the best. I would like to tell these gentlemen about a device that in my mind is far simpler and not so expensive.

Some three years ago I commenced to think up some means of easily and quickly lifting the car from off its wheels to relieve the tire when the car was not in use, as I believed that by thus relieving the tire of the weight of the car it certainly would be a great saving on them. At that time I was not particularly interested in a turntable as I had no use for one. However, after several attempts I finally succeeded in constructing a practical device with which I could raise all four wheels clear of the floor in one minute's time, and to my surprise and gratification, found the device was equally useful for shifting the car about the floor or using it for a turntable.

I have been using this jack-truck and turntable for the past two years and would not do without it for several times its cost. This useful and practical device will be placed on the market soon, and I feel certain that it will appeal above anything else in its line to automobile owners, but must be seen to be appreciated.

I am taking the liberty of mailing to you under separate cover a little booklet describing this jack-truck and turntable. The illustration plainly indicates how the lift is made—a simple leverage over a

moving fulcrum. Adjust the standards to the proper height for the axle. Place it under the same as indicated and press the lever down until the end caster rests on the floor. Withdraw the bar and the trick is done.

Why Do They?

From Dr. E. Burd, Iowa.—Some things I do not understand. Will your readers kindly help me out? If inner-liners, inter-liners, reliners, innershoes, inner-tube protectors, tire protectors, detachable treads, durable treads, triple tire protectors, triple treads, leather treads, etc., etc., etc., are of such great value in preventing punctures and blow-outs (and they surely must be of great value in such prevention because their manufacturers say they are), I cannot understand why the tire manufacturers do not place them in, and upon their tires when the tires are manufactured. If a few extra layers of cotton fabric will produce such extraordinary results, why should the purchaser have to complete the tire building at his private garage, at his private expense, when it could be done so much cheaper and better by the manufacturers at the time the tire is made? Kindly show me! Further, why do car manufacturers still persist in equipping cars with generators when they know that generators are of little account to a man who has to use his car at night?

Reply.—The value of tire protectors and non-slipping devices has been pretty well demonstrated. But the special kind of such protector or non-slipping device, or whether they are required or not, depends so much upon the individual choice of the car owner, the use to which the car is put and the roads upon which it is used, that the manufacturer probably feels he should leave this to such choice, although tire manufacturers make different grades, weights, sizes and treads. A good many wearers of shoes like cork insoles or rubber heels and plates to keep the heels from wearing out at the rear, but shoe manufacturers do not provide them. Moreover, many tire protectors are not designed for use upon new tires, but only when the tires have been much worn.

Heating Transmissions.

From O. H. Hampton, Indiana.—Planetary transmissions, using constricting bands for applying slow or reverse gear, frequently get heated on account of the bands being too close a fit on the drums, or on account of sticky oil or grease leaking out of the drums and dirt or sand sticking to them. When not in use they should hang entirely free or they will heat the transmission and the friction will also absorb more or less of the power of the motor.

Cause of Spongy Vulcanized Rubber.

From G. W. Clough, Ohio.—In your issue of April you have an inquiry from Alva H. Wyman. Permit the writer to offer a correction in your reply. The reason that the patch he put on was spongy was due to moisture. If there is the slightest dampness the heat from the vulcanizer will cause this moisture to vaporize and force through the plastic rubber making it spongy. The wound must be absolutely dry and chemically clean to insure a good and lasting job.

Hot Water and Cold Radiator.

From Dr. M. J. Hall, New York.—Tell all your subscribers never to put hot water in a Ford T radiator

on a cold morning. I did so, and the result was a cracked radiator which cost \$14 to repair. I have cut out every item in your magazine in relation to a Ford, and posted it in an old telephone book and indexed it, so I have anything I want in a moment's search.

The Krit Touring Car.

This car has established a fine reputation for the time it has been on the market, and it is claimed for it that it has more power per pound weight than any stock car on the market. Be this as it may, the car is unusually light, the Model K here illustrated, weighing but 1,800 pounds. It is guaranteed for one year and the price is but \$900 fully equipped. The following are some of its specifications:

Crank Shaft—Drop forged from special alloy crank shaft steel.

Valves—Interchangeable inlet and exhaust valves, mechanically operated and placed on same side of motor.

Clutch—Floating type multiple disc running in oil.



Pistons and Rings—Pistons machined from grey iron castings, turned true, annealed and ground to size.

Transmission—Selective type sliding gear supported on annular type ball bearings. Three speeds forward and one reverse.

Steering Mechanism—Worm and full sector type.

Motor Cooling—Water circulation by Thermo Syphon system.

Carburetor—Float feed type. Controlled by throttle operated from top of steering column.

Ignition—High tension Bosch magneto.

Lubrication—Motor lubrication by splash feed from crank case.

Front Axle—One piece drop forged I beam, Vanadium steel.

Rear Axle—Semi-floating type. Ball and roller bearing. Gears adjustable for wear.

Brakes—Two internal expanding and two external contracting on rear wheels.

Wheels—Thirty-two inch, 12 spoke artillery.

Speeds—Two forward and one reverse.

Long Wheel Base—Low center of gravity.

Lessons in Accidents.

From Dr. J. E. Spatz, Nebraska.—I wish to express my appreciation of your page on accidents. I think it an excellent method of impressing drivers with the fact that most serious accidents can be avoided by careful driving. In my own case I am sure that the reading of each month's list stimulates that cerebral center we call caution, to the extent that I never take chances and consequently have never had an accident of any kind in five years of year round driving.

THE LOCAL DEALER.

The Relations of the Jobber and the Manufacturer to the Retail Trade.

(An address to the Automobile Trade by Mr. Chester Clark Boynton, General Manager for A. R. Mosler & Co., of New York. Published by request.)

So much has been said about the jobber and wholesale distributor and their fair and unfair methods, that it seems only just that a word of warning should be sounded to the local dealer in favor of the direct dealing with the manufacturer, either by direct dealing through the mail or by direct and personal contact through the personal agent or representative of the factory.

Why does any dealer buy through a jobber? Because he gets prompt service—because he can depend upon the jobber carrying in stock a complete line of goods ready for immediate shipment. The moment, my dear friends, that the jobber ceases to be a source of supply, he no longer can be of help to the dealer. The moment the jobber begins making direct shipments from the factory to you, Mr. Dealer, he has ceased to be of any service as a jobber to you, but becomes nothing more than a scalper of profits. The dealer is surely entitled to all the profit he can get. Why then divide with the so-called jobber who has become a scalper? Mr. Dealer—My advice to you is to put down and out as far as possible, unfair competition. Stop right now! Do not place another order with a competing house. If the so-called jobber you buy from runs a store next door, you are giving him a profit on your business (wholesale) to spend in taking business away from you at retail. You are entitled to all the retail, long price business in your town. You ought not to be compelled to buy from you next door neighbor.

Big buying does not make a jobber. If I owned six stores in six small cities and sold all my goods at retail would I be a jobber? No! But I buy in big quantities; I have a salesman who sells all my surplus stock at—I was going to say cost, but perhaps I would come nearer the actual facts if I said cut prices.

I say to you gentlemen, that such houses are not jobbers, they are nothing more than owners of a string of retail stores and not entitled to one particle of consideration at the hands of either the manufacturer or local dealer who only jeopardizes his own business every time he accepts from such a so-called jobber an order or gives him one to fill.

The dangerous menace to the local automobile dealer today, is the so-called jobber, who manufactures, who jobs, who retails, automobile supplies.

What chance has the local dealer against such a company and combination of interests? None, and if you assist in supporting such, you must expect to find your business slipping from you. You can expect nothing but damages and ruin.

As a manufacturer, I can honestly say, Mr. Dealer, our interests are mutual. Then why not send your order direct to the manufacturer; or to the legitimate jobber who is not also a competitor? Does the so-called manufacturing, retailing, store-keeping jobber help you? No. I say No a thousand times but you are helping him build up a business that when he once gets established, he will be through with you forever.

Just one word more of don'ts. Don't buy Syndicate Catalogues that only publish goods on which the so-called jobber; the publishing printing jobber gets an

inside profit. Buy your catalogue, if you must have it printed for you from a reliable Catalogue Printing Company, who have no axe to grind and who have the right price to give and who catalogue the right goods for you to sell. Don't patronize the so-called jobbing, retail, storekeeper who poses as a legitimate jobber only to secure an unfair advantage over the dealer by buying in quantities which the dealer cannot buy in and which the so-called jobber does not job.

Gentlemen:—I thank you very much for your attention. I trust you will appreciate that there is nothing personal in my remarks. I believe in the honest selling of merchandise, and a square deal for all.

Force Feed Lubrication.

Although most cars are fitted with either splash lubrication or both splash and force feed, yet the force feed gives little trouble. When, however, the indicator on the dashboard ceases to indicate, the cause is somewhat difficult to ascertain. The causes of this are various, but the first and commonest is insufficiency of lubricating oil, either in the oil tank or sump, as the case may be. It must be remembered that when the engine is running there is a great deal of oil in suspension, and, although there may be a small quantity of oil in the tank at starting, this is soon absorbed in the engine, but after stopping for a few minutes it may drop back into the sump. Thus a false idea of the amount of oil in the system is obtained. Blockage of the pipe between the pump and the indicator is the most obvious cause of trouble, but is the one which least often occurs, as there is generally a good filter in the system and it takes a comparatively large obstruction completely to close the oil pipe. However, where there is a by-pass between the indicator and the pump a small piece of grit may hold the by-pass valve off its seat, in which case the oil, instead of going to the engine via the indicator, returns to the tank, seeking the path of least resistance.

Another cause is a broken or loose connection in the pipe between the pump and the tank. If any leakage occur in this pipe the pump, instead of sucking oil, will draw air, and will not operate the gauge or force oil to the working parts.

The oil pumps used are sometimes driven through a safety device, as is frequently the case with water circulating pumps. The safety device generally takes the form of a soft taper pin. It is made weak and soft, so that if any hard obstruction lodge in the pump the pin will shear and allow the pump to stand still, whereas otherwise the pump would grind the obstruction and at the same time damage itself.

The writer generally wraps the end of the pipe between the tank and the pump with insulating tape bound over with copper wire for about three inches. Then if the oil pipe break at its connection to the union no leakage would occur, and the system would continue to work perfectly. If this be done, and all oil carefully filtered before being put into the tank, no trouble should be experienced.

There are a great many things in the advertising department of this paper which are of value to every reader, and that is the reason we urge them to scan the advertising department each month for anything new that may be coming out, and a good many new things are coming out all the time.

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ADVERTISING RATES MADE KNOWN ON APPLICATION.

NEW YORK, MAY, 1912.

Missing Numbers—Our Readers are requested to remember that it always gives us pleasure to re-send numbers which have gone astray in the mails.

The Automobile Dealer and Repairer in Australia and New Zealand.

Mr. R. Hill, Matlock House, Devonport, Auckland, New Zealand, is our accredited representative in Australia and New Zealand for obtaining new subscriptions.

FALSE AND REAL ECONOMIES.

Most of us have our pet economies. Often they are inconsistent with plain common sense.

The writer of this vividly remembers that in his childhood days his blessed mother had a horror of "wasting matches." Quite likely this feeling may have been inherited from ancestors who lived at a time when matches were a luxury. At all events, we are unable to recall any other family custom which bespoke so much thrift. Some business men have a penchant for saving bits of string with which bundles are tied, and many a valuable moment is lost in this practice. Other well-to-do business men in the name of economy make themselves fairly miserable smoking cheap cigars. Now the writer of this has a repugnance for poor tobacco, but he confesses to such a horror of waste of gas or electric light that he has quite likely very much injured his overworked eyes in his indulgence of this idiosyncrasy.

Thus we might go on almost indefinitely citing instances of inconsistent and irrational pet economies, although many of us are quite as short-sighted in allowing flagrant waste while we practice them.

For illustration, many consider it a saving to purchase a low-priced lubricant for their automobiles, although it is an expensive waste. Others cannot spare the time to give five minutes before taking out their car to see that bolts and nuts are secure and that the oil holes are not stopped up. Yet the difference in cost between the low-priced and the high-priced lubricant, or the saving of five minutes time is likely to entail an expense of a good many dollars paid to the repair man or reduce the value of their cars several hundred dollars each.

The saving of time and strength in neglecting to pump tires hard enough is very little, yet it often causes a loss of \$50 or \$100 in ruined tires. There cannot be much more enjoyment in driving carelessly than in driving with care, yet all over the country there is a greater

destruction of automobiles from this source in an hour than in a month of careful driving.

A tire manufacturer in Germany has recently made exhaustive tests to determine why pneumatic tires give out. The results show that 24 per cent. of the casings fail owing to the fault of the owner of the car and that three-fourths of this per cent. is due to lack of pumping. In the case of the inner tubes more than 56 per cent. of the failures are due to carelessness.

In the case of a horse drawn vehicle, an obstruction in the road causes a momentary easing up by the horse and thus the shock to the vehicle is very much reduced. In the automobile, there is no such relinquishing of force, consequently far more care should be exercised in avoiding such obstructions. Yet this is not the usual custom, although every one so encountered shortens the life of the car.

The fact is, one may save more in a year by the careful use of his car than he can in a lifetime by the practice of the common economies by which many of us seem to be obsessed.

UP TO THE LIMIT.

Again and again good cars are condemned when the trouble is solely due to the rough, careless and indifferent treatment they have received from owners or chauffeurs.

Any one who imagines that an automobile may frequently be used at the limit of its power provokes impatience. Suppose a man were obliged to use every pound of his strength and every power of his brain, how long would he last? How long will a horse last if obliged to pull every pound he can pull and travel just as fast as he can travel?

In such cases, either would be ruined very quickly—possibly in a day, a week, a month—surely in less than a year. Yet many seem to think an automobile may be sent up an incline at top speed and one that it could not possibly negotiate if the hill were an inch steeper, and yet do it no harm.

No person or thing can be worked up to the limit for a long period without giving out, somewhere or somehow. In the case of a symmetrical car or a symmetrical man, the period of usefulness may be longer than in the case of one with an unusually "weakest link," but in any case the ruin will be soon accomplished.

And when the car gives out where is the blame usually placed? Upon the manufacturer of course.

DANGER IN EXTREMES.

It is singular how we are all inclined to look with envy or admiration—usually envy—at the advantages of others.

The obscure see the distinguished and famous winning the plaudits of the multitude, and yearn for such consideration; the poor note the doings of the rich, and too often grudgingly and with discontent; the industrious often cast longing eyes toward the idle and question or doubt the wisdom of conditions making for such extremes.

But the discontent is not all on the side of what may be considered the less fortunate, and on the side of those who are really the unfortunate. The distinguished and the famous often long for the peace and apparent freedom of the obscure, we have heard a rich woman say, "How I envy the poor their happiness," not stopping to reflect that all she had to do was to give her wealth away and then she could be just as happy as poor folk; the idle often feel that they would

give almost anything if they had the good digestion, the health and the relish for food, that are enjoyed by the hard workers.

The lesson, the deduction, the moral? Well, it is just this: All experience and observation teaches us not only to avoid extremes but to follow Nature in trying to maintain a balance—a golden mean—wherein lies the greatest content and happiness. The extreme of poverty is bad and so is the extreme of wealth. The extreme of idleness or leisure is bad and so is the extreme of toil. The extreme of renown and fame are bad, and so is the extreme of obscurity.

IN AN INSANE HURRY.

The bane of this country is hurry.

It is the cause of more destruction and death, more waste and ruin, than any other pest with which this country of extravagant excesses has ever been afflicted. The Titanic horror was a conspicuous example of it; railway accidents are almost invariably due to it; without it automobile accidents would be practically unknown.

In the case of travel this craze is manifest in undue speed, by the itching to get somewhere or anywhere and at once; to go through the country as if one were shot out of a gun; to travel without seeing or reflecting. In the case of business it is shown in the common use of that bombastic term "hustle," and the later used expression, "going some," both indications of unhealthy business practice, as is likewise the "dictated but not read" letter.

Now there is just as much difference between the qualities of hurry and despatch as there is between master—and an ignorant and inefficient master at that—and servant. Hurry is always agitated and pushing but never doing anything well; it is beset by mistakes and accidents; it is forever doing things over the second time. Despatch is self-possessed, always doing and always doing well.

Isn't it time to call a halt? Isn't it time to be less rapidly efficient and superficial and more slowly proficient and thorough? Isn't it time that speed should be tempered with care and hurry with sane despatch?

TIRE ECONOMY.

The life of a pneumatic tire depends much upon the speed with which the car is driven. There are reasons for this not at first apparent. The faster a car is driven the greater the heat of the tire, and heat not only destroys the strength of rubber, but it very decidedly reduces its wearing capacity.

Again, when a car is driven at a moderate speed, the tires roll over the ground; when the car is driven rapidly the tires have a certain tendency to slip backward, or rather to turn faster than they are carried forward, thus creating friction and wear.

The reason why tires on wheels of large diameter give longer and better service than on small wheels is not only because they have a greater area of rubber in contact with the road, but because the larger tire has a longer surface for wear than the small one. Neither do they move as fast relatively as the small tires in making a given speed.

On the other hand, of course the larger tire costs far more than the smaller one, and more in proportion to its larger size than superficial consideration might fancy. It should not be forgotten that there is nearly twice the length of material in a tire for a wheel four feet in diameter that there is in a wheel three feet in diameter.

Finally, other conditions being equal, the tire made of the highest grade of rubber has the longest life and is the most resilient.

Purchasers of pneumatic tires should not fail to take the foregoing into consideration. Tire buyers are inclined to be "penny wise and pound foolish" but in no other purchase is this practice so expensive.

COMMON SENSE OF SPEED.

Just now the "powers that be" in New York City are feeling that something must be done to curb reckless automobile driving, and proper speed limits are receiving much attention.

The matter will never be settled rightly until the police have the power to arrest any driver who is endangering the lives of other users of the streets, whether he is going 5 or 25 miles an hour. Fixed limits never will work; conditions are too varying. This of course puts a good deal of authority upon a body of men which may not invariably have the best of judgment, but we see no other way to solve the problem.

Whether an automobile is being driven too rapidly depends upon varying conditions of locality and traffic. To fix speed limits to cover these conditions not only does not make the streets fairly safe, but it also creates questions of veracity between the officer making the arrest and the driver of the automobile. It is none of the public's business how fast a car is being driven if it does not endanger others; it is the public's business, no matter how slow a car may be driven, if it does endanger others.

The police have the power of regulating traffic—according to rules laid down for them, of course—in other respects; there is no reason why this should not apply to the speed of automobiles.

THE PRICE OF GASOLINE.

Not only in this country but over practically the whole of Europe there has been a substantial rise in the price of gasoline. The price in New York during February averaged about 24 cents a gallon for the so-called 86 degree grade, the price in February of the previous year being approximately 21 cents. This is something like 12 per cent. advance.

Dealers usually attribute this rise in price to increased use of the petroleum products, but if the increased demand is not accompanied by a falling off in the supply it can hardly be called a valid reason for the additional cost. In other words, if it costs no more than it has to produce, then the selling price should be no higher. Or, if the selling price has been raised, then the profits must have been raised likewise, either for the dealers or the producers. It is, however, fair to assume that the cost of handling may be slightly more than a year ago owing to a possible slight raise in the pay of the workmen.

RECKLESS DRIVING.

According to verified reports, from January 1, 1911, to March 31, 1912, reckless automobile driving in New York City was responsible for 188 persons killed and 1319 injured. It has for some time been plainly apparent that cars were being driven too fast in such crowded thoroughfares.

Of course, the only way to stop this recklessness is not to wait until an accident occurs but to arrest all who drive in such a way as to endanger other users of the streets, no matter whether they are driving three or thirty miles an hour. The practice in New York of

making an arrest only after an accident occurs is an unwise one. "Prevention is better than cure."

It is gratifying to note that among those who call most sternly for reform in driving are the rational and self-respecting car owners and drivers themselves, and these are the great majority. But the reckless, ignorant and unscrupulous unjustly bring reproach upon all others. Like the cuttlefish they contaminate and blacken every street through which they pass and leave behind them a trail of public apprehension and contempt.

SEALED AND SIGNED.

Some years ago when tea was much higher in price than it is at present, we knew a grocer who sold it at three prices—75 and 90 cents, and \$1 per pound. But it all came out of the same chest. He used to most highly and eloquently recommend his 90 cent quality, thus striking a somewhat happy medium of iniquity.

It is now claimed that in some garages a man can get any kind of lubricant he asks for and it all comes out of the same tank. If this is a condition and not a mere theory, it may behoove purchasers to buy only of dealers who are above suspicion or insist that their oil be delivered to them in sealed and labeled cans.

ROAD IMPROVEMENT.

It is a pleasure to learn that the legislature of New Hampshire has appropriated \$3,000,000 to improve the roads of that state. It was high time. Some of our readers will remember the scoring given to the roads of New Hampshire by one of our correspondents about a year ago. He characterized them as a disgrace to the state.

Vermont is also coming to the front with an appropriation of \$2,000,000 for good roads to be expended within two years.

LESSONS FOR DRIVERS.

Carelessness and Ignorance Responsible for Most Accidents.

The feeling against reckless driving is intensifying. Thoughtful men know that the cause of motoring is very much injured by malicious and reckless individuals and they are thus working for reform by both example and precept. It is getting to be a fact that fast driving is "more honored in the breach than in the observance." Meantime with the increasing use of the car during the spring season accidents are extremely frequent. Space is found for but few only of the hundreds reported.

A Fatal Crash Into a Railway Train.—Three persons were killed and two seriously injured on the Illinois Central tracks in a suburb of Chicago when an automobile was struck by a passenger train. The accident happened at a grade crossing. Accidents of this kind are growing extremely frequent, and already there is a renewed agitation to have grade crossings abolished in thickly settled localities.

Woman Hurlled From a Car and Killed.—Near Oakland, Cal., a young woman was hurlled from a car, which struck a telegraph pole. She received a fractured skull from which she died. Two men and five other women were in the car but they were not seriously injured. It appears that the car skidded on a patch of wet pavement.

On His First Trip.—Near Albany, N. Y., a well-

known man recently bought a 90 h.p. car and was just bringing it home from New York. He was at the wheel and the chauffeur was on the front seat beside him. At a turn in the road, a rear tire blew out. The car swerved sharply and was upset. The driver and owner fell in the road directly under the car and had his skull fractured. The chauffeur escaped with a broken leg.

Crashed Through a Garage Wall.—In Philadelphia a man was returning from a trip with his wife. Owing to the steep grade leading to the front door of the garage, he was obliged to put on high speed to enter. The car shot up through the front door, but the driver lost control of the brakes and the car continued straight through the garage smashing the rear wall which was of wood. The car continued with scarcely any diminishing of speed and landed in a quarry pit. Fortunately the riders were thrown out before the car went over the precipice and they lay unconscious for some time. The car was of course a total wreck and the occupants received painful, but perhaps not fatal injuries.

Collision with a Street Car.—In Nashville, Tenn., an automobile driver crashed head-on into a street car. The automobile was wrecked and one of the occupants of the car may die. The driver of the automobile failed to observe the rules of the road and attempted to run out and around the stationary car. He crashed into another car however, and while one of the occupants escaped with minor bruises, the other is likely to die.

Flings a Lad Fifty Feet and Speeds On.—An eleven-year-old boy is lying in a hospital in Chicago with a fractured skull. The police are searching for the driver who knocked him down and left him lying in the road while he sped away. As the lad was crossing the street the car struck him and he was thrown fifty feet. His chances of recovery are slight, but it is hoped that the criminal occupants of the car may be apprehended.

A Wheel Needed Oil.—Near Red Bank, N. J., while four men were riding in a car at moderate speed, the rear axle broke, letting the car down and throwing out the passengers. The accident was due to the axle becoming hot and snapping off owing to a lack of lubrication.

Result of a Bursted Tire.—Near Fresno, Cal., a man and his wife and daughter were thrown from a car when the tire bursted and the machine turned over. That they escaped with so little injury is not much short of a miracle. The bursting of the tire caused the car to skid and break the axle from the right front wheel. The child was thrown nearly thirty feet, but strange to say was not seriously hurt, although the car was a total wreck.

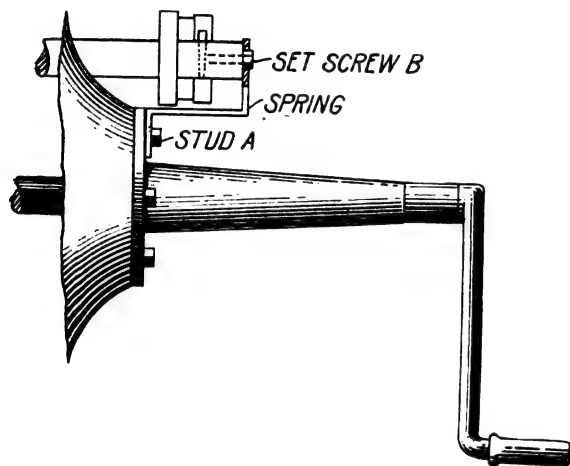
Head-On Collisions.—Collisions of automobiles head-on are becoming extremely frequent. Of course they are usually due to the carelessness of either one or the other and may easily be avoided by a little foresight. Near Hackensack, N. J., the other day a big Overland car and a small Ford runabout came together in darkness and rain and the small Ford car with its occupants were knocked into a ditch, pretty well destroying the car and badly shaking up the riders.

In writing to advertisers, for catalogues, circulars, or information of any kind, kindly confer a favor upon the publishers of this journal by mentioning The Automobile Dealer and Repairer.

Timer Spring Tension.

From F. S. C., Pennsylvania.—I notice what J. B. has to say about increasing the tension of the timer spring of his Brush, by adding a piece of brass $1/32$ or $1/16$ inches thick. To overcome this trouble on my 1910 Brush, I let up on the set screw B at the end of the timer shaft, took out the pin, and turned it around (as it has a taper hole on one side), and let it extend out a little more. This will give a better contact. I might say that this did not stop the missing. After my car had been run about 3,000 miles, the missing started and all the Brush experts could not stop it. This missing, however, only occurred at high speed from 15 to 20 miles per hour. After going over all the wiring, to see that same was in good shape, I found the following device overcame the trouble.

I took a piece of hoop iron about six inches long and one inch wide, put a hole in one end large enough to fit over the stud A, took off the nut and placed the iron over the stud, and then bent an off-set so as to allow the other end to touch the set screw B in the



end of the timer shaft. Bend it so there will be a good tension on the screw, or drill a hole large enough to go over the set screw; then the iron will rest against the timer shaft and the set screw will keep it in place. Tighten the stud nut and the missing trouble should be over.

The object of this spring is, it makes a positive ground at all times. The current is grounded by the timer shaft only, and when this becomes worn and is well oiled, it will cause missing at high speed, as there are only six volts going through it. About every car (without a magneto) in this city has followed the idea and overcome that trouble. Since installing a magneto, I do not need this spring, as it is only necessary to start on the coil. Mr. Jones' carburetor is more than likely the same as I experienced.

The small screws that hold the butterfly in place have worked out and you will, no doubt, find them in the intake port of the cylinder. This allows the butterfly to get out of place and you cannot throttle the motor with any success. If this is found to be the case, put cotter pins in place of the screws. J. B.'s advice as to carbon and lubrication, is very good, but attention should be given to the timing of the motor. The book of instructions from the Brush people, will tell you how this is done.

Careless application of brakes and the sharp turning of corners at high speed tend to lower tire efficiency.

SECOND-HAND CARS.

A New Problem for Dealers in New York City to Solve.

A problem is looming large on the trade horizon in New York City that alike concerns pleasure car and truck manufacturers, also makers of light delivery wagons.

Recent calculations by one well known authority indicate that this spring not much more than 15 to 20 per cent. of the registrations at the branch office of the Secretary of State has been new cars, the other being cars registered by their old owners or by new owners who have bought old cars. In view of the heavy sales by some makers this is an interesting sidelight on the selling conditions of automobiles. It is apparently due to two main causes—the fact that autos are being built so much better nowadays that they last longer than formerly and the fact that to make sales it is getting to be necessary to make such large allowances for old cars as to eat into the profits on the new cars very seriously.

The secondary phase of the problem is how to get rid of the old cars traded in. It was once possible to sell them readily for use as pleasure cars, but the character of demand, as well as of supply, has greatly changed. The average man who will buy a second handed car is the novice or the man of very limited means. What he wants is a car of moderate power and size, "to experiment with and learn," he says, yet if he pays the price for a second-handed car that the dealer who "traded it in" must demand to get a new dollar for an old one he is paying so much that he might better buy a low priced new car, and often does. The recent development of low priced cars has put so many excellent cars on the market that they have seriously affected the market for second-handed cars which formerly sold at from \$1,000 to \$1,500.

Then again, the man who buys a new car every season is growing scarce, and today most of such people are confined to the very wealthy who own large powered and large capacity cars. This means that a great share of the second-handed cars available are too elaborate and expensive to maintain by the novice who is in the second-hand market. This drives the dealer to serious straits to know how to get rid of his large powered touring cars taken in trade for new ones. Men who want that type of car are not usually buyers of the second-hand vehicles. In his extremity the average agent has discovered that the best way to work off such large cars is as commercial vehicles of the light delivery type, and many hundreds of them are now in process of preparation for the market in such utility.

Some concerns which have seriously entered this class of trade are wondering whether or not it is possible to make both ends meet on that line of trade, though it seems to be the most practical method yet discovered. Suppose a car is traded in at about \$700 or \$800 allowance—a car on which the dealer originally made a profit of say \$1,000—and on the new car his nominal profit is perhaps \$1,000. He puts the traded-in car in his shops, spends say \$250 in overhauling it, changing the gears, renewing wearing parts and bushings, altering the steering gear and perhaps levers to meet its new requirements, then invests perhaps \$200 for new tires, expends \$400 for a new delivery body and painting, and when he has the wagon ready for market it stands him in an investment of say \$1,600. It will sell in the market to

some business man with light and stylish delivery service to perform—a florist or a caterer or laundryman, for instance—for probably \$2,000 or \$2,200 and give him very good service, especially if he charges off some of its excess operating expense to advertising.

But from the standpoint of the dealer the profits on the transaction are dubious. In order to make the \$1,000 he netted—or expects to net—on the new car he sold the old owner he has had to invest \$1,600 in a second-handed delivery wagon. This leaves him that much out till he sells the latter, and then \$600 behind. And if he sells it at say \$2,100 he makes a profit of \$500, which would leave him a net loss of \$100 on the whole transaction. The only place he can really offset this is to remember that two or three years ago he made perhaps \$1,000 on the old car which he has now converted to commercial purposes.

This may be a somewhat extreme view of the case, but it really represents some of the experiences of the trade in trying to get their new models into service with old owners and keeping up appearances of being "up to date" in their cars and demand. It is one of the recently evolved problems of the trade and one which is giving the trade more to think about than most of them will admit. The only factor who seems to be benefiting strongly by it is the business man who gets a really serviceable delivery wagon for possibly two-thirds what a new one would cost him.

Caused by the Magneto.

Not long ago a reader found his car was misfiring when it was accelerated and that the engine refused to run slowly. Another carburetor was tried, also a new set of spark plugs and new wiring to the magneto. This had no effect, showing that these parts were not responsible. The magneto was removed and generally tuned up; the valve tappets were carefully examined and all the valves ground in without success. Another magneto was tried, with the result that the misfiring immediately ceased. This obviously pointed to the old magneto as being the culprit, and it was then necessary to find out what was the defect. It was found that the distributor plate which carries the segments was covered with a very thin scale of carbon connecting the distributor segments together electrically. The carbon brush had been carefully cleaned, and the distributor plate wiped, but the carbon brush had evidently been somewhat rough originally, and it scored the distributor plate, leaving particles of carbon in the grooves it had cut. This seemed to be the only possible defect in the magneto, so the distributor plate was cleaned up with some fine emery paper, and the engine ran perfectly. Subsequently the trouble recurred, but was cured by cleaning up the plate and brass segments.

A Lubricating Defect.

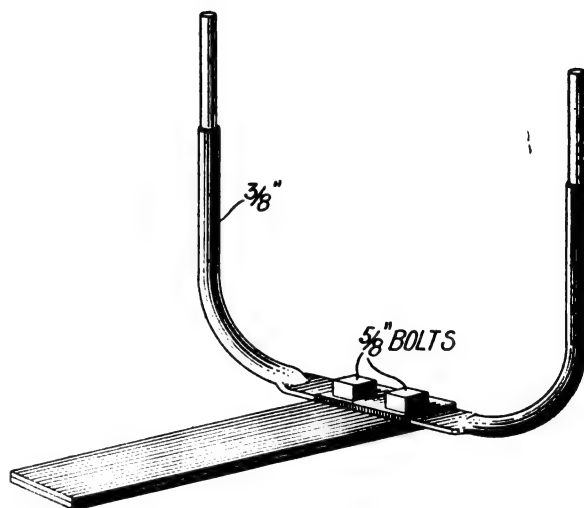
Lubrication feed according to the speed of the engine is a popular and in some respects admirable system. But let it be supposed that the oil delivered is exactly correct when the car is running at twenty miles an hour on a perfectly level road, then it is obvious that the oil supply will be increased when the car is running down a gradient at thirty miles an hour, and that if no change in gear be made the supply in lubrication will be decreased when it is running fifteen miles an hour up a gradient. This, of course, is exactly the reverse of what should be the case, because at thirty miles an hour downhill the

engine would probably be working under a much lighter load than when it is pulling the car fifteen miles an hour uphill, hence at this thirty miles an hour it will require less oil than at the slower speed uphill. In other words, the feed proportionate to engine speed would only be correct provided that the load also was always proportional to the engine speed, whereas, of course, such is not the case under ordinary running, although in the end the two features will probably average out tolerably equal. It is this fact which causes most engines to smoke.

On a slightly down gradient or on the level with the wind behind one, a mere whiff of gas will maintain a car at a fairly high speed, and in these circumstances the engine load is exceedingly light whilst the supply of oil is comparatively heavy. The cylinder walls, therefore, get over-lubricated, with the result that smoking occurs.

A Home-Made Head Lamp Bracket.

In some cars which are exclusively used for day running purposes, it is not thought necessary to fit a head lamp and therefore the bracket for this purpose is omitted from the equipment. If, however, it is desirable for a special purpose to take the car out at night, the driver



Lamp Bracket.

will find himself at a disadvantage, and although in most cases a lamp can be borrowed from the local repairer it is not always possible to obtain a bracket to fit it. Therefore it may be interesting to describe how one driver devises a temporary arrangement which answers and was made at very little cost.

First of all two pieces of round steel bar were obtained about $\frac{3}{8}$ inch thick and long enough to make the stays of the bracket. These were then curved so as to take the lamp. The two top ends were shouldered slightly to hold the lamp, while the other two ends were flattened and drilled so that they would take a $\frac{5}{8}$ inch bolt. Two pieces of flat steel a little wider than the dumb iron were taken and these were drilled to correspond with the holes in the pieces of curved bar and the bars were thus affixed to the strips by means of a $\frac{5}{8}$ inch bolt and nut. By using a piece of rubber or felt as a packing this carrier was prevented from scratching the varnish on the car. If round dumb irons are used on the car it is necessary to curve the flat pieces of steel so as to fit them properly and the brackets so made will be found to answer for practical purposes quite as well as one of the more expensive arrangements which can be bought for the purpose.

FOR HOME PAINTERS.

Painting and Finishing the Automobile Quickly and Cheaply at Little Cost.

BY M. C. HILICK

The car owner is rightly concerned with keeping his car in a good painted and varnished condition at a reasonable expense. Especially is this true of the owner of the medium and comparatively low priced car.

As a rule it is not necessary to burn the paint from the car when it is shopped for repairs. Nor is it even essential to put on a number of coats of rough-stuff and rub the surface down with artificial rubbing brick. These latter operations simply represent extreme methods of meeting surface emergencies and need not often be resorted to.

Instead, when the car comes to the paint shop, get it in a good location and put it up so the wheels run clear. These latter remove. Also, take off other furnishings which are in the way and likely to hinder quick painting operations.

Usually the body of the car is splashed up more or less with grease and oil to remove which wet up some cotton waste or a piece of woolen cloth with turpentine and rub smartly.

Then to beat off the dirt nibs, and smooth up the surface, and remove the scum of gases and road accumulations, give the surface a light rub over with a felt pad moistened in clean water and dipped in pumice stone flour, after which wash the surface thoroughly.

If the surface is to go black, or dark blue, or even dark green, apply first a coat of straight drop black. Get this color—and for that matter, all colors—ground in japan, and thin with turpentine, adding for this coat one part raw linseed oil to four parts turpentine. Let the color stand over night before recoating, thus giving it ample time to grip hard and fast to the old paint foundation. If blue or green are used over the black thin the color with turpentine and apply a thin coat. Then take some of the color, say about 3 ounces, and stir it into a pint of rubbing varnish. Use a flat, half elastic bristle varnish brush to put this varnish color on, and flow the material in plentiful volume. For the next coat which after two days may be put on, add a tablespoonful of color to a full pint of rubbing varnish. This will serve to keep the color nice and true to its original shade. Rub this coat, when dry, with pumice stone flour and water, clean up carefully and finish with a good grade of body finishing varnish.

This is about as simple and quick a process as can be used for good work. For the color coats use double thick, 2 inch camel's hair brushes; for the varnish color use 2½ inch half elastic bristle brushes, and for finishing use full elastic bristle brushes, all of first-class quality. It never pays to use a cheap, inferior brush.

For the chassis or running parts, clean up with two parts crude oil and five parts turpentine, using also a steel scraper or two to loosen up the hard old paint layers. The main part of the chassis painting is to get the parts cleaned up in good shape.

If any of these parts are plated or scaled off in a way to expose the metal, touch all such places, after cleaning, with a bit of lead paint. Let this dry well and then sandpaper the parts all over uniformly and put on a coat of color prepared as above detailed. Next lay on a coat of varnish color and in due time

finish with a single coat of heavy gear or chassis finishing varnish.

All of the above work, with some instruction and practice, the handy, non-professional painters can do well enough perhaps to satisfy himself and his friends who are not over exacting.

We advise the use of varnish for the outer coats because varnish is not only a natural protector of the color coats, but during service it will stand up and hold its gloss under the erosive effects of the various cleaners and polishes better than most, if not all, other kinds of finishing materials. The high gloss surfaces need only to be washed with clean water after road service until the varnish loses its brilliancy, after which time the various trustworthy varnish cleaners and polishes may be used to advantage.

Accurate Temperature Control in Vulcanizing.

To those who are not familiar with vulcanization as applied to the repairing of tires it may be defined as the process of heating raw Para gum, to which have been added chemicals, chiefly sulphur, until it reaches the state in which we see it in a finished tire. This heating process is called curing. When the raw rubber, of a consistency somewhat like chewing gum, is heated to the correct temperature and held firmly against cured rubber, the result is a union of the new and old material. So homogeneous is the weld that, if well made, it is even stronger than the adjacent rubber and absolutely cannot be separated from it. Although this result may be approximated by chemical means, the actual application of heat is acknowledged to be essential to a perfect union.

In the repair of automobile tires, when a slow cure is desired, a temperature of 250 degrees Fahr. can be used; for a quick cure, a temperature as high as 275 degrees, but should these limits be exceeded the result will be on the one hand, failure to cure the Para gum, on the other, burning of the rubber or at least curing it so hard as to destroy its resilience. Therefore, aside from convenience of operation, the usefulness and reliability of any vulcanizer, be it heated by steam, electricity or direct flame, depends largely upon the ease with which the temperature can be controlled. Naturally, a control which is automatic is desirable as such a control would do away with the necessity for constant vigilance on the part of the operator to keep the vulcanizer within the temperature limits mentioned above.

A new type of vulcanizer, heated by steam to insure uniform distribution of the heat to the vulcanizing surface and give all parts of a repair the same cure, obtains this regulation in an ingenious manner. Referring to the illustration it will be seen that at the upper end of the flue or flame passage there is a damper, normally held wide open by a thermostat, or spring composed of strips of brass and steel riveted together. As brass expands faster than steel upon being heated, heating the thermostat causes it to bend away from the vulcanizer body and lower the damper. Any given temperature causes a definite bending of the thermostat as the relation between the expansive properties of brass and steel is fixed. Likewise as the closing of the damper regulates the intensity of the flame, which reaches its maximum with the damper wide open and a minimum as the damper closes and obstructs the draft, a given position of the damper will hold the temperature of the vulcanizer at a definite point. By adjusting the screw in the damper an equilibrium between the weight of the

dampers and the tension of the spring can be obtained which will keep the temperature of the vulcanizer wherever desired. In practice it is carefully adjusted to maintain 265 degrees, as this has been found to be the best temperature for general work. Despite the simplicity and ruggedness of the controlling device it is so accurate that the thermometer attached to the vulcanizer will not register any fluctuation while the alcohol lamp is lighted.

Further than making it impossible for the most careless operator to overcure a repair, there is the advantage of being able to heat the vulcanizer while the repair is being prepared, and then to move it from one repair to another without cooling.

SELF-STARTERS.

Something About the Most of Those Now Being Put on the Market.

BY GEORGE C. MARTIN IN *Auto Topics*:

An important benefit which the average automobilist may expect to derive from a good automobile magazine lies in this, that he may reasonably hope to find therein an occasional discussion of the accessories he is figuring in buying for his car, and these discussions he has a right to expect to be untinctured by any of the arts of sales advertising. Sales talks, as a general proposition, are likely enough to be more misleading than enlightening, and my observation is that this is practically true in regard to self-starters for automobiles, which are not always clearly understood even by the men who are offering them for sale.

A detailed description of all of the self-starters on the market, which number several dozen at least, would of course be out of place and out of the question here, but a general notion of the principle upon which they are all constructed and upon which they all operate may be easily conveyed.

The electric starters will not be mentioned, for the reason that they are not yet sold, so far as I know at least, for application to cars which were not originally provided with means for their application, and the matter of applying the electric starter, if one were sold, would probably be too difficult and too expensive to make its application to old cars very common. Some of the electric starters are doubtless better in some respects than others, but so far as I know they are all efficient, and generally speaking, may be depended upon to do the work for which they are made.

Besides the electric starters there are numerous devices operating upon three different principles: First, those using a coil spring; second, those using an explosive gas; and third, those using compressed air as the means of putting the engine into motion.

The spring starters are of several designs; but they all work on the same general idea, that is, they revolve the crank shaft in the proper direction through the agency of a stiff coil spring, which has been previously wound tight for that purpose. The spring in all cases is automatically wound up by the engine, although in some of the devices an extra provision is made for winding the spring by means of the crank in cases of emergency. They all have the advantage enjoyed with the electric devices of being equally efficient whether the engine stops on a dead center or not. Obviously both the compressed air and gas starters must fail when the engine is centered. This, however, is a condition of not very frequent occurrence and it does not involve any great

amount of labor to move the engine off center with the crank when it does stop there.

The compressed air and the explosive gas starters operate alike in this much, that they both turn the engine by means of pressure exerted upon the piston which happens to stop in firing position. In both types, the air or gas, as the case may be, is admitted to the proper cylinder through a distributor which is installed somewhere between the engine and the gas or air tank, generally located under the car.

The gas starters are divided into two classes—those using gasoline vapor for an explosive mixture, and those using acetylene gas for the same purpose. In both cases the operation of the devices is practically the same. The charge of gas is pumped or forced into the cylinder, which is stopped on the power stroke, where it is ignited by pressure on a button on the dash or by manipulation of the spark lever, in the same manner as when the engine is started on the spark. Everybody knows, of course, that starting on the spark simply means that a charge of gas has been left in the proper cylinder from the last time the engine was used, which may be exploded by means of the proper manipulation of the ignition device. There is a button usually provided upon the magneto which when pressed will cause a spark to pass between the points of the spark plug if the distributing points of the magneto happen to be in contact. If they do not happen to be in contact they may be brought into that position by manipulation of the spark advancing or retarding lever.

The gas self-starters supply the charge of explosive gas if it has leaked out of the cylinder since the engine was stopped. One very frequently hears the suggestion that an engine cylinder will hold its compression for a long period of time. The probable truth of the matter is that an engine cylinder will not hold compression longer than two or three minutes. The gases in the cylinder under compression leak very rapidly around the piston and between the ends of the piston rings.

In the gas starters using gasoline for an explosive mixture, mechanism is provided by means of which compressed air is forced to take a proper amount of gasoline to make a mixture, practically stimulating the mixture ordinarily drawn into the engine through the carburetor while the engine is running, which mixture is forced into the cylinder under some compression and may then be fired by the ignition system in the manner above mentioned.

In the acetylene starter the gas is admitted from the prestolite tank into the proper cylinder, where it is exploded by the spark in a like manner. There are two important differences between gasoline gas and acetylene gas in connection with their availability as an explosive mixture which may very materially affect their use in starting devices, and they are: First, that acetylene is a permanent gas and although it will mix readily with air it will not condense, and second, acetylene gas has a very wide range of explosive proportion. That is to say, a mixture of acetylene gas and air is explosive whenever the proportion of gas to the air is from three to eighty-five per cent. and as is well known the proportion of gasoline and air must be very nearly correct before an explosion in the mixture may be expected. The reason that a gasoline mixture will not explode after being left in the cylinder for any length of time is that the gasoline in the mixture has condensed into the form of liquid gasoline on the metallic walls of the cylinder. This condensing process is very much more rapid when the engine is cold than it is when the engine hot. It is very likely, therefore, that it will be safer to say that



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the engine will start on the spark as long as it is warm rather than to say as long as the engine has held its compression.

The peculiarities, however, of the acetylene gas, make possible its use in a self-starter differing quite materially from the other types mentioned. In this last mentioned starter, the gas is admitted into the manifold before the engine has come to rest but after the ignition has been switched off. The result of throwing off the spark before the engine has stopped and permitting the gas to flow into the manifold is that a charge of acetylene is drawn into the engine cylinder along with the gasoline vapor and air from the carburetor. The gasoline vapor may condense, but the acetylene gas, being permanent, will remain in gaseous form and even though the cylinder may lose all of its compression there will still remain in the cylinder a charge of gas which will readily ignite even at atmospheric pressure.

In this form of starter mechanism is provided whereby acetylene is automatically admitted into the manifold when the spark is switched off, so that all the user is required to do, when he desires to stop his engine and leave it ready to start again on the spark, is to switch off his ignition system. It would seem that a starter of this type should be very easily and very cheaply installed on any make of car, and unless there is some injurious chemical action which may take place between the acetylene and the parts of the car or the lubricant, I should think it would fill the requirements of the general run of automobile users.

Of course it is necessary to reduce the pressure which is ordinarily found in the prestolite tank, before admitting the gas into the cylinder. It would seem that this pressure reducer would be the vital part of the device and should be very carefully looked into, because while it is not harmful to start the engine on the spark ordinarily, it might be very injurious to the engine to explode a heavy charge of acetylene gas in the cylinder while the engine is at rest.

Another advantage which is claimed for this last mentioned device is that in cases of emergency the engine may be operated on the acetylene for a time sufficient at least to get the engine thoroughly warmed up.

Several of the self-starters on the market, both electric and spring, are provided with a friction device which permits the engine to kick back through the friction without injury to the self-starter and without necessitating any mechanism for throwing any gears out of mesh or any clutches out of engagement. I should think that such a device ought to be a part of all types of starters except the gas and compressed air starters.

One of the most ingenious devices for use in connection with gasoline self-starters is manufactured in Los Angeles and was invented, I understand, by Mr. Saunders of Los Angeles.

This is a device to take the place of the rotating distributor which is found on all gasoline or air starters, and although a radical departure, so far as I know, from old practice, is one which seems to me to be constructed on a very excellent principle and one which should be very efficient in service. The distributor consists of four cylinders cast in opposition and each cylinder contains a sliding valve working on very much the same principle as the old-fashioned reciprocating valve for steam engines, except that the movement of the valve is not controlled by an arbitrary movement of any of the parts of the device, but is regulated by pressure.

The operation is automatic and is regulated by the pressure in the pistons, thus when a charge is injected through the pump into the valve chamber, it is forced

to seek the two cylinders which are under compression by reason of the fact that the valve has automatically closed itself against the two cylinders against which the valves are open.

In this way the device is not called upon to act except during the period while the engine is being actually started, thus minimizing the wear. Of course the Saunders device is accompanied with the conventional pump and carburetor which are the necessary complements of the gasoline self-starters.

Some Minor Motor Car Repairs.

A good deal of care and attention necessary in dealing with a motor car is absorbed in correcting the minor faults which, if allowed to go on without attention, are apt to develop into grave defects, and although there is nothing strikingly technical or complex about such work, it is advisable from time to time to refer to such matters in order that they may not escape notice. In view of this two or three experiences in this direction may be given in order to show the class of work and observation which is necessary in order to keep the mechanism of a motor car in first class condition.

The first of the incidents which will be mentioned occurred in connection with the back axle of a moderate sized car. It was noticed during the operation of greasing the car that when the back wheels were jacked up and were being turned round, a very peculiar grinding noise was heard in the back axle. This was due to the small bevel of the back propeller of cardan shaft being too deeply in mesh with the large bevel. Moreover it was found that the grease worked out very freely between the joints of the axle casing and it was therefore thought advisable to dismantle the axle and overhaul it thoroughly in order to put it right. When the parts had been taken down it was found on examination that the axle had been fitted up with new fibre washers, and that these had been fitted in a careless manner, as they were not correct in width. As a matter of fact one of them should have been a little thicker than the other and this had not been attended to. These washers were between the differential casing and the outside casing of the axle and the result of these being fitted wrongly was that the axle was not in its proper centre. This was, therefore the evident explanation of the grinding noise in the car which had been noticed, and by filing these washers a little at a time and then trying on the outer casing they were gradually fitted in the proper position. When the axle was put into place again it was found that the grinding noise had disappeared. This was also a good opportunity to cure the large leakage of grease, and when the casing was down a brown paper washer was cut to suit the opening, and this was coated with gold size, and left to harden. Subsequently when it was put into place it was found that it kept the grease in the box that had formerly been in the habit of working out of the axle.

Another point which requires careful attention if a car is to be run in a safe and efficient manner is to give periodical observation to the conditions of the pins on the steering. After the car has run 5,000 or 6,000 miles, all the bolts and steering will be found to have a considerable amount of wear. In one such instance it was noticed that these pins on the steering and steering arms were slightly worn, and this of course caused a good deal of play on the steering wheel. In order to rectify this defect the old pins

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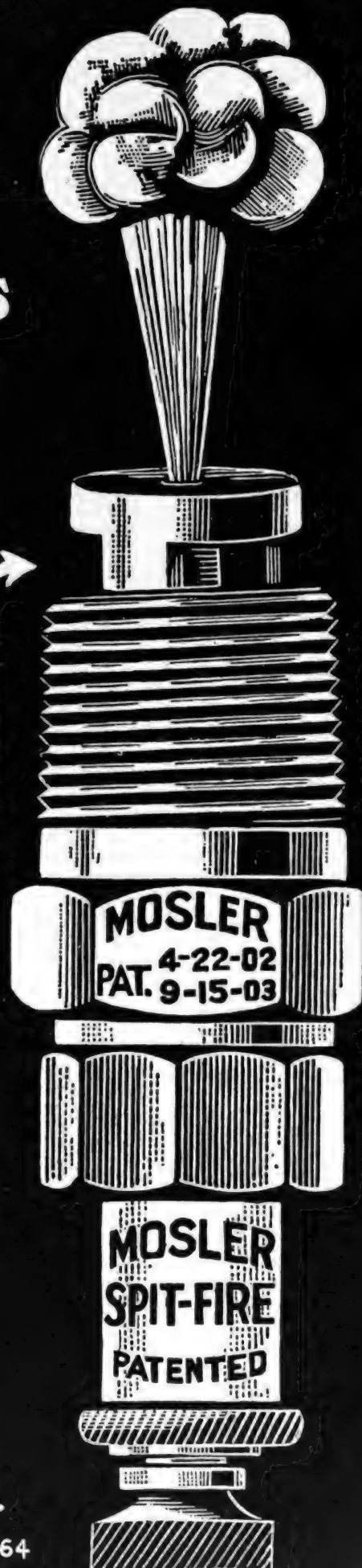
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64



were taken out and the holes on being examined were found to be slightly oval due to the wear. It was therefore found advisable to reamer the holes for the pins in the brass bushes and it then became necessary to make new pins to fit the holes correctly. These pins were then turned up specially in a lathe. It may be mentioned by the way that a good many jobs go into the repair shop owing to slackness of the steering arms, where a little tightening in the above mentioned manner is all that is necessary. If, however, the matter is left too long it will be impossible to apply this simple remedy and the renewal of steering arms is a job of a rather expensive nature, as new ones have to be turned. When these pins had been attended to it was noticed that there was still a little play on the steering wheel and in this case the worm was adjusted so as to counterbalance the play. This, however, is not always a safe expedient, as in some cases when the worm is worn a good deal it should be renewed. Otherwise a bad accident due to faulty steering might be the result.

In overhauling cars it is astonishing to find how much trouble is caused by careless and injudicious work on the part of an inexperienced person. In one case the sparking plug proved very refractory under attempts to remove it. It fitted so tightly into the cylinder that it was impossible to remove it with a spanner in the ordinary way, but it was highly desirable to have it removed in order to clean it and adjust the points. It therefore became necessary to take the cap off bringing the valve away and the plug and the whole of its parts was then put into the vice. After soaking them well in paraffin it was found possible to remove the plug, but after getting it out it was apparent that the thread on the plug was stripped and therefore it was of no further use. Examination of the valve thread inside the valve cap or dome showed that this was also stripped a little and therefore before fitting in a new plug it became necessary to tap it out with a screw tap and it happened that it was a rather difficult job to obtain a tap of the right size. Then on gradually screwing up the plug it was found to fit into position. The whole of this trouble had occurred through fitting in the old plug in a cross thread manner and the incident points to the fact that care should be taken when fitting sparking plugs to see that they are not entered on a cross thread. It is a very simple matter to exercise the proper precaution, and a good deal of trouble can be avoided if the mechanic in charge of the car understands what he is doing and pays proper attention to the small details of his work.

Air-Cooled Motors.

The development of the air-cooled automobile engine, according to a prominent exponent of this type of engine, is based on two ideas. One is that it is at a wall temperature of about 350 degrees that the cylinder of a gas engine does its best work and gets the greatest power out of the gasoline. Water-cooled engines can not be run at this temperature, because at 212 degrees the water boils and the cooling system becomes inoperative, whereas an air-cooled motor can approach this temperature and the heat still be rapidly thrown off. Thus with the air-cooling is produced a powerful explosion of a large charge of gas. The kind of economy which consists of getting the maximum of energy is claimed by the advocates of air-cooling for their product through the maintenance of the most efficient degree of temperature.

The second idea upon which is based the development of the last few years in the air-cooled gasoline engine is that water-cooling requires a lot of unnecessary and troublesome complication. Air-cooling is direct, water-cooling indirect. Air is the ultimate cooling agent in either case. The question of difference is one only of whether the air shall directly cool the cylinders or some medium shall be introduced between engine and air.

The introduction of water as such a medium makes necessary the burdening of the engine with water jackets, radiators, pipes, pumps and the other apparatus which go to make up the various water-cooling systems. These are productive of three evils which are impossible with an air-cooled motor—freezing, boiling dry and leaking. Air-cooling is a simplification of water-cooling; or it is perhaps more expressive of the fact to say that water-cooling is a complication of air-cooling. Of course there are counter objections against the use of air-cooling, the advocates of water-cooling claiming less fuel and oil consumption, more perfect cooling, more convenience in the way of less attention to engine, etc.

Help the New Owner.

No matter how explicit the dealer's instructions, the new driver always has a certain amount of nervousness when driving his car for the first few days. Later on that feeling wears off and he is in a better position to exercise his judgment as regards the niceties of driving and the mechanical details connected with his car, but, as a rule, the damage is done in those first few days.

Now, if the service department would only go to the trouble of sending an experienced man out with the new driver once or twice, and then follow up the good work by having the man call every few days at first to note how the car is running and how the owner is taking care of it, the criticism which could be offered and which would undoubtedly be thankfully accepted at this time would redound to the dealer's credit very favorably by the end of the season, and the owner who has been well treated will generally tell his friends. This system need not be so very expensive if intelligently applied.

Of course, not all owners will need this assistance, and those that do will need it only for the first few weeks of driving, after which, if started right, they can be depended on to take care of themselves. But on the theory that prevention is better than a cure, we believe many dealers would find an extension of their service department in this direction very profitable.

A Favor.

We are anxious to add at least 10,000 new subscribers to our list this season. To accomplish this, we ask every present subscriber as opportunity offers to say a good word for the Automobile Dealer and Repairer to his friends.

Tell them what a practical paper it is, and how much good it is likely to do them. If each present subscriber could influence just one new subscriber, it would give us the new subscribers we want and more than double that many.

Approximately some thirty million dollars' worth of electrics have been sold since 1895, and out of that amount at least \$10,000,000 worth, one-third of the total value, have been sold in the last eighteen months.

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Words and claims—no matter how oily—won't lubricate your car.

Your business sense asks :

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We will sketch briefly the experience behind the oils recommended below.

Power-engineers all over the world recognize the authoritative leadership of the Vacuum Oil Company.

From Stockholm to Cape Town, from New York to Shanghai, leading manufacturing plants depend on our Gargoyle brand lubricants.

We supply 75% of the world's battleships, most of the ocean greyhounds, and practically every aeroplane in active use. Outside of the American market, we furnish lubricants to over seventy foreign automobile manufacturers.

Such buyers show small interest in words and claims, or price per gallon.

They select an oil for only one reason—because it gives more and better lubrication *per dollar expended*.

That necessitates both the right *quality* of oil and the correct *grade* for the purpose.

The success of Gargoyle Mobiloils with American and foreign automobilists is due to exact manufacturing methods.

Before making our recommendations, we analyzed the construction of every American car and practically every foreign make.

That was not easy. But correct lubrication is not an easy problem.

Different makes of automobile motors differ widely. Several distinct grades of lubricating oil were needed.

We produced these oils, distilling and filtering them to remove free carbon.

The various grades were given the following names:

- Gargoyle Mobiloil "A."
- Gargoyle Mobiloil "B."
- Gargoyle Mobiloil "D."
- Gargoyle Mobiloil "E."
- Gargoyle Mobiloil "Arctic."

Below you will see listed the correct grade of oil for 111 makes of automobiles—for both Summer and Winter.

Space limits the list of cars. On request we will supply our more complete list with recommendations.

Gargoyle Mobiloils are put up in barrels, half-barrels, in 5 and 1 gallon sealed white cans. All are branded with the Gargoyle, which is our mark of manufacture.

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A guide to correct Automobile lubrication

Explanation: In the schedule, the letter opposite the car indicates the grade of Gargoyle Mobiloil that should be used. For example, "A" means "Gargoyle Mobiloil A." "Arc" means "Gargoyle Mobiloil Arctic." For all electric vehicles use Gargoyle Mobiloil A. The recommendations cover both pleasure and commercial vehicles unless otherwise noted

MODEL OF CARS	1908	1909	1910	1911	1912
Abbott Detroit	Summer	Winter	Summer	Winter	Summer
Alco	A	A	A	A	A
American	A	A	A	A	A
Apperson	A	A	A	A	A
Atlas	A	A	A	A	A
Com'l	A	A	A	A	A
Austin	A	A	A	A	A
Autocar (2 cyl)	A	A	A	A	A
(2 cyl) Com'l	A	A	A	A	A
Beas.	A	A	A	A	A
Bergdoll	A	A	A	A	A
Brush	A	A	A	A	A
Buick (2 cyl)	A	A	A	A	A
(4 cyl)	A	A	A	A	A
Cadillac (2 cyl)	A	A	A	A	A
(4 cyl)	A	A	A	A	A
Carters	A	A	A	A	A
Com'l	A	A	A	A	A
Cas.	A	A	A	A	A
Chadwick	A	A	A	A	A
Chalmers	A	A	A	A	A
Chen.	A	A	A	A	A
Cole	A	A	A	A	A
Columbia	A	A	A	A	A
Columbia Knight	A	A	A	A	A
Coupe Gear	A	A	A	A	A
Croston-Keston	A	A	A	A	A
Deimler	A	A	A	A	A
Deimler Knight	A	A	A	A	A
Derraco	A	A	A	A	A
De Dion	A	A	A	A	A
DeLahaye	A	A	A	A	A
Delaney-Belleville	A	A	A	A	A
Elmore	A	A	A	A	A
E. M. F.	A	A	A	A	A
Flat	A	A	A	A	A
Flinders	A	A	A	A	A
Ford	A	A	A	A	A
Franklin	A	A	A	A	A
Com'l	A	A	A	A	A
Grum.	A	A	A	A	A
Grum-Logan	A	A	A	A	A
Hewitt (2 cyl)	A	A	A	A	A

MODEL OF CARS	1908	1909	1910	1911	1912
Hewitt (4 cyl)	A	A	A	A	A
Hudson	A	A	A	A	A
Hupmobile	A	A	A	A	A
International	A	A	A	A	A
Interstate	A	A	A	A	A
Isotta	A	A	A	A	A
Italia	A	A	A	A	A
Jackson (2 cyl)	A	A	A	A	A
(4 cyl)	A	A	A	A	A
Kelly	A	A	A	A	A
Kissel-Kar	A	A	A	A	A
Com'l	A	A	A	A	A
Kline Kar	A	A	A	A	A
Knox	A	A	A	A	A
Krit	A	A	A	A	A
Lambert	A	A	A	A	A
Com'l	A	A	A	A	A
Lancia	A	A	A	A	A
Locomobile	A	A	A	A	A
Lozier	A	A	A	A	A
Mack	A	A	A	A	A
Marion	A	A	A	A	A
Marmion	A	A	A	A	A
Matheson	A	A	A	A	A

MODEL OF CARS	1908	1909	1910	1911	1912
Maxwell (2 cyl)	A	A	A	A	A
(4 cyl)	A	A	A	A	A
Mercedes	A	A	A	A	A
Mercedes Knight	A	A	A	A	A
Mercer	A	A	A	A	A
Mitchell	A	A	A	A	A
Moon	A	A	A	A	A
National	A	A	A	A	A
Oakland	A	A	A	A	A
Oldsmobile	A	A	A	A	A
Overland	A	A	A	A	A
Packard	A	A	A	A	A
Panhard	A	A	A	A	A
Panhard Knight	A	A	A	A	A
Peerless	A	A	A	A	A
Pennsylvania	A	A	A	A	A
Pierce Arrow	A	A	A	A	A
Com'l	A	A	A	A	A
Pope Hartford	A	A	A	A	A
Premier	A	A	A	A	A
Rambler	A	A	A	A	A
Rapid	A	A	A	A	A
Regal	A	A	A	A	A
Renault	A	A	A	A	A
Reo	A	A	A	A	A
Royal Tourist	A	A	A	A	A
Selden	A	A	A	A	A
Simplex	A	A	A	A	A
Speedwell	A	A	A	A	A
Stanley	A	A	A	A	A
Stearns	A	A	A	A	A
Stearns Knight	A	A	A	A	A
Stevens Duryea	A	A	A	A	A
Stoddard Dayton	A	A	A	A	A
Stoddard Dayton-Knight	A	A	A	A	A
Thomas	A	A	A	A	A
Walter	A	A	A	A	A
Welch	A	A	A	A	A
Welch Detroit	A	A	A	A	A
White (Gas)	A	A	A	A	A
(Steam)	A	A	A	A	A
Winton	A	A	A	A	A



TO THE TRADE:—You will find this page advertisement in Saturday Evening Post of May 25th, Collier's of May 25th, Life of May 23rd, Literary Digest of May 18th and Scientific American of May 25th. We will run strong, conspicuous announcements in these publications until the latter part of the Summer. In the Fall we will go into most of the leading monthly magazines. Leading motoring journals will be used throughout the year. Take advantage of this advertising by stocking promptly with the various grades of Gargoyle Mobiloils.

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Watch Cams and Gears.

From Gas Power.—Many gas engines, whether stationary, portable, traction, automobile or motor boat, after a season of busy service show less power than they originally had and the operator is often driven to his wit's end to locate the cause of the trouble. They fret over the carburetor, and puzzle over the ignition system, they take out the piston rings and the valves, and examine them for leaks. They look over the radiation and the lubrication, the clutches, etc., and yet they are not able to solve the mystery.

Possibly after a long, despairing and fruitless search they either by accident or by the kind suggestion of a friend "who knows nothing at all about motors," look at the cam shaft gear and find excessive lost motion there by reason of wear, or a loose condition of the gear where it is keyed or pinned to the shaft. As a rule the teeth in the gear have become so worn at the point of the valve lift that it is quite late in opening, which prevents a free and full charge to the engine if it is the intake valve that is laying behind, and if it is the exhaust valve alone even worse condition obtains. Because, not only does the cylinder fail to relieve itself in due time of all the burnt gases that should pass out through the exhaust, but the pressure within the cylinder is not entirely relieved when the time comes for closing of the exhaust valve; consequently when the intake opens to receive the following charge of fuel, the pressure in the cylinder will prevent the entering of any fresh gas until the piston has traveled far enough on the inhalation stroke to reduce the pressure below atmospheric. As a result, only a partial charge is admitted with the latter end of the inhalation stroke and the fresh supply is mixed with the dead gases remaining from the previous choked exhausts, so that if ignition occurs at all it can at best give only a weak impulse. Many anxieties and worries may be obviated by guarding the valve gears and cams against undue wear and lost motion.

One of the most effective ways of cleaning out a radiator that has become foul is to connect it with a boiler and allow steam to blow through it for an hour or two. It is necessary, of course, to make sure that not enough pressure accumulates to burst any of the tubes.

Rubber tubing connections between gas tank and the headlights should be of the best grade of material obtainable for the purpose and should be renewed whenever the rubber dries out and begins to reveal tiny cracks around the connections.

Muffler explosions and backfiring are apt to be confused. Muffler explosions, result from the discharge from the cylinders of quantities of unburnt gases, while backfiring is caused by the ignition of a body of gas in the intake manifold which is on its way to the cylinders. The two difficulties are caused by opposite conditions.

If you run short of gasoline in a locality where the supply cannot be replenished, you can often get home by mixing ordinary stove naphtha or even kerosene with the fuel remaining in your tank. Of course, the carburetor will need adjustment and the main thing to remember is to keep the engine running constantly and keep it hot, so as to vaporize the mixture readily.

Long Stroke Engines.

J. B. Entz before the Cleveland Engineering Society.—A $4\frac{1}{2}$ by $4\frac{1}{2}$ -inch engine is of the same cylinder volume as a 4-inch bore by $5\frac{3}{4}$ -inch stroke, but it has an area of piston head 26 per cent. greater. If, during the waiting stroke, the pressure per square inch were the same in each case, the total pressure would be 26 per cent. greater, but you would get no greater turning effort as the crank on which it acts is proportionately shorter. The loss in the crankshaft bearing is, however, increased, due to the greater pressure on them and the fact that the crankpins and mainshaft bearings turn in their boxes but once per revolution, whether the stroke be long or short. The side pressure of the pistons on the cylinder walls is also greater, due to the greater pressure on the larger piston head in the short-stroke motor. The result is a higher mechanical efficiency for the long-stroke motor, as it has less internal friction. The piston weight and connecting-rod weight is less in the long-stroke motor, due to the small size of the piston and less pressure on it.

The wall area of the compression space is less in the long-stroke motor because of its shape, and the heat units lost are therefore less. The long-stroke motor has, therefore, a higher thermal, or heat efficiency than the short-stroke, and, as the thermal efficiency is lowest at low speeds, the long-stroke motor pulls better at low speeds.

The extent to which the cylinder is filled on the suction stroke is not determined by the speed of the gases in the cylinder as they follow the piston on its down stroke, but by the very much higher speed through the carburetor, inlet passages and valves, which is the same in the case of both engines. Also the rate of expansion of the gas on the working stroke after it has been ignited is not different in the two engines, as in each case the expansion is from the volume contained in the compression chamber to the total volume of the cylinder and this takes place in the same length of time at the same number of revolutions per minute.

The best relation of stroke to bore, or most practical relation, according to the latest practice in Europe and this country, is a stroke 1.4 to 1.5 bore, although engines have been built with a stroke more than twice the bore. It may be interesting to show how the valves open in relation to the position of the piston and the piston speed at different points in the stroke, although this is not necessarily different in the long and short-stroke engine.

A card is taken from an engine with an indicator made for that purpose. The exhaust valve opens about 45 degrees before the piston reaches the lower center, which in this case was $\frac{3}{4}$ inch on a $6\frac{1}{2}$ -inch stroke.

As the piston movement is slowest around its lowest center, the valve is half open or more at the lowest center or finish of the power stroke, although it did not commence to open until the power stroke was practically finished. The exhaust valve opens very rapidly at first in relation to the piston movement, as it should, to permit the easy escape of the exhaust gases. The exhaust valve closes a little past the top center, about 5 degrees, which corresponds to a very small downward movement of the piston on the suction stroke. The inlet valve opens a few degrees after the exhaust closes, and as it opens after the piston passes top center, its opening is not nearly so rapid in respect to piston movement as was the open-

\$1,000 CASH REWARD



SEND 5 CENTS IN STAMPS FOR PICTURE IN COLORS

THE BRICTSON MFG. CO. Have set aside \$1,000.00 in cash, which they offer to pay to any person or persons that can run more miles on a set of Pneumatic rubber tires WITHOUT Brictson Detachable Treads applied than WITH. This offer is open to the MOTORING PUBLIC including the MANUFACTURERS of RUBBER TIRES. Remember, this is a CASH "proposition"—none of your CHEAP "trophies," with an inflated valuation.

THIS IS A REAL BLUFF—WHO WILL CALL IT?

Now, Mr. "Free Adviser," You who are always so vitally interested in advising some fellow motorist against using Treads, whispering confidentially in his ear that he must not use them as they will ruin his tires, cause blowouts, heat the tubes and cause them to break—and all such foolish and untrue talk that has been "trumped" up by some one interested in keeping down the sale of tire protectors, something that is a REAL NECESSITY—that ALL MOTORISTS SHOULD HAVE—here is a chance to prove your statements. We stand ready and willing to prove ours. Now, if you KNOW so much about the "TIRE GAME" get busy at once, for according to YOUR advice, the \$1,000.00 will be "EASY MONEY."

CONDITIONS OF THE CONTEST

THE BRICTSON MFG. CO. Will use the same 66-H. P. six cylinder, seven passenger Pierce-Arrow car herein above illustrated, weighing 6,500 pounds, fully equipped with "BRICTSON" DETACHABLE TREADS, that won the tire test last July in the "TWIN CITY TO HELENA AUTO TOUR," and which was also OFFICIAL PRESS CAR AND STARTER in 1911 BIG GLIDDEN TOUR—New York City to Jacksonville, Florida.

THE CONTESTING CAR shall be one of same size and weight, using exactly the same size tires and tubes, and the tires and tubes on both cars must be exactly alike, so that one contestant will not have unfair advantage of the other.

The same schedule of TWENTY MILES PER HOUR shall be maintained—the same as in all A. A. A. tours for this class of cars. Each party shall have the privilege of furnishing an observer, who shall be a passenger in the contesting car. The run shall start from Brookings, S. D., and extend West to Los Angeles, California, and return.

TO LIVE DEALERS.

Do you realize that "BRICTSON" DETACHABLE TREADS are the best tire protectors on the market and that 1912 Models are even superior to the 1911 treads that made such a sensation in THE TWIN CITY TO HELENA TOUR, also the Big Glidden Tour (New York City to Jacksonville, Florida)?

Isn't it about time you were getting in line to reap your share of the profits from their sale in your territory? Some one will if you don't.

It is getting to a point now where Brictson Agencies are at a premium. Why not beat the other fellow to it and stick to it after you do get it, for the longer you have the BRICTSON AGENCY the greater asset it becomes. Send the coupon in the lower left hand corner of this page and we will do the rest.

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BRICTSON
MFG. CO.,**

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Without obligation on my
part, send me your dealer's price
list and full particulars.

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about "BRICTSON" DETACHABLE TREADS
Send me your booklet, "The Enemy of Tire
Expense," proofs from Automobile owners, Prices, etc.

Size of Tire.....
Name.....
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ing of the exhaust valve, which started before lower center was reached.

The piston speed is higher near the top center than the bottom center on account of the angularity of connecting-rod. The inlet valve opening is smaller in proportion to the piston speed at the beginning of the suction stroke than it is on the last part of the stroke, where it is wide open after the piston speed has commenced to decrease. This is as it should be, as although the piston movement is the actuating force that moves the air and draws it into the cylinder, yet the inertia of the air causes it to lag behind at the first part of the stroke and after it has obtained velocity and momentum it continues to enter the cylinder even when the piston has reached the end of the stroke and for some distance on the upward stroke. The higher the speed of the engine, the more the advantage in the late closing of the inlet valve. But the closing is very good, as the valve is half open at the end of the stroke and is closed when the piston has moved $\frac{1}{2}$ inch upward on the compression stroke, thus not permitting of much loss of the charge even at slow speeds.

Material for Repairs.

Now that motor car manufacturers are making the utmost use of the latest discoveries in high tensile steel, it behooves repairers to be extremely careful in selecting material to replace any broken part of a car if they intend to make this part rather than buy it from the makers of the car. The dimensions of the part in the material used by the makers may give an ample margin of safety, while if it were made of the ordinary mild steel of commerce there would possibly be no factor of safety at all.

In replacing any part of a car, the repairer will not steel, it behooves repairers to be extremely careful in the market. All the best steel makers advertise extensively, and are quite willing to give full details as to the strength and suitability of their various brands of steel to anyone, even if one bar only is required.

There are now many brands of steel in use, and steel firms are continually sending along samples of new steels. The repairer should be very careful to keep his stock of steel plainly marked in the various qualities, and keep a record of the special treatment required for each.

This also is a matter that is becoming more pressing every day. Makers are using steels that require special heat treatment, and if the repairer gets hold of some parts made of one of these steels he may be able to do nothing with them, or he may spoil them by not knowing the correct treatment of the steel for hardening, etc. If prices and time allowed, it would be much better for repairers to use nothing but the parts made by the makers of the car, but this is not always possible. Considering that the very best material that can be bought is cheap in comparison to the labor put upon it to finish it, a repairer really gains nothing by buying a common material, as the heaviest part of the car weighs little; and it costs nearly as much to finish a common steel as it does to finish the best. With the exception perhaps of aluminum, which generally fails because the design did not afford strength enough to stand the work in the first case, there is no other material used in motor car construction that gives much trouble. Any good bronze makes efficient bushing material, and there are many brands of anti-friction metal which can be used with confidence.

More About Sam.

From O. H. Hampton, Indiana.—“Hello, Sam! Haven't seen you for a month. Come round tonight and give an account of your shortcomings and eat half a dozen big apples.”

Sam appeared on time and I reminded him that it was away last fall since he had honored me with his presence in the flesh, and that I wanted a full account of himself.

“It might be a longer jumble of events and happenings than you would care to listen to,” said Sam, “but did I ever tell you about the old German we met up with in Richmond last fall?”

“Let's have the story,” said I.

“Well, me and my friend Overman concluded we would go to Richmond on Sunday afternoon. After about the usual number of tricks and delays that an old automobile plays on a fellow, we came to a place in the edge of town where the street was torn up for repairs and we could get no farther, so we ran the machine to the side of the street and stopped it. On the opposite side of the street was a vacant lot of low ground that had been used for a dumping place till it was covered with loads of clay, garbage and most everything that folks wanted to get rid of. The land was several feet lower than the street, and a big touring car, a fine new one, had run down the bank and bucked its front wheels into a big pile of muddy clay, and the only thing I ever saw that looked leader than that car, was a huge locomotive I once saw lying on it's side in the ditch at the side of the track.

“By the side of the car stood an old German, making frantic gestures for us to come across. Overman said there was trouble and suggested we go over and help him.” We took a little time, however, to look over our own old car, and when we looked across again the old fellow was still beckoning, while on the other side of the car was his great big buxom frau, and she was making motions too, for us, to come over.

“Near by stood her daughters, two very nice looking young ladies of German descent; their faces bearing expressions of mixed amusement and vexation. The usual small crowd was standing on the sidewalk, and among them stood a pair of Irishmen, and I heard one of them say: ‘Jimmy, git your eye on the two purty gurrils!’ ‘Sure,’ said his mate; ‘as foine as ye'd mate in a day's walk, but the loikes of thim is not for us. Let's g'wan and be havin' a dhring.’ ‘Well, oi dunno,’ said his mate. ‘Come an now, come an now,’ said the other. ‘Wan will hurrt nobody an' two's not many,’ and they wandered on.

“I felt inclined to try the effect of about two drinks myself, but couldn't very well leave just then, so I said to the old German: ‘Now tell me your troubles.’

“‘Drubbles is it? Drubbles is it? Dot vill pe too long a story. All my lifes I many drubbles haf.’

“‘Oh, I didn't mean you to tell us all the troubles you have ever had, but what is your trouble just now?’

“‘Vell, she dry to run away from me und I dink she neffer will shtop if she don'd got shtuck in der schmootz.’ ‘Who tried to run away from you, your wife?’ I asked.

“‘Nein, nein, she neffer dry to run away from me. She know besser as dot. Der ferdommed car dry to run mit me. I shtop der ingine und now she vont grank vonce. I dink I haf grank so much she 'bout vor out in her grank, but she don' go some more.’

“I looked over the machine and found the car-

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NOTE:—The following is but one of many similar letters we are constantly receiving from men who know:

BOYD TRANSFER & STORAGE CO.,
Minneapolis, Minn.

ATWATER KENT MFG. WORKS,
PHILADELPHIA, PA.

Gentlemen:

About a year ago, we were induced to try one of your Unisparkers on a motor truck and found same to be such an improvement over the spark coils which we were then using that we equipped all the rest of our seven trucks with your systems, and are recommending it to our customers to replace either spark coils or magnetos. Two of our cars were equipped with high-grade magnetos, but we found your ignition system to be far preferable in every way.

Very truly yours,

(Signed) BOYD TRANSFER & STORAGE CO.

buretor shutter closed and things flooded with gasoline. He had forgotten to turn the current on. I opened the shutter and switched the current on and told him to crank. The motor started on the first half turn of the crank, to his great surprise.

"Vell; vell; vat you do to her?" he asked.

"Switched the current on," I said.

"Vos dot all? Yust gick me a few times now."

"Then we started away, but he called to us and said; 'Vatch me git oudt vonce,' meaning would we wait to see whether he got onto the roadway. He got out all right to where the frau and the girls had preceded him, stopped the car for them to get in, then took off his hat and made a farewell salute to us while the ladies did the same with their handkerchiefs, and they rolled away happier than if nothing had happened to them. As we crossed the street to our own machine Overman said, 'We have established a reputation as expert automobile engineers.'"

"Been drinking anything lately?" I asked Sam, changing the subject.

"Well, no," said Sam. "I got two or three setbacks on that here a while back, and my boy showed some signs of following in my tracks. I reckon no matter if a man is fool enough to drink, he don't want his boys to. One day I had a few drinks and was still in the saloon when in came my oldest boy. I was caught dead to rights, but I called the boy over and asked him what he would have. We had a couple of high balls and I thought it would be a good time to talk to him about intemperance, so I said, 'Son, I would rather you would not drink at all, but it is up to you to decide. But if you determine to drink, which is of course foolish, perhaps I can put you next to a rule that if strictly followed will prevent you from getting beyond the point of respectability. Suppose you come in here and those two men are sitting at that table over in the corner. You take maybe two or three drinks and think you don't feel it much, so you take another one and all at once you begin to feel the effects of all you have taken. Now if you want to know the effect of drink keep watching those two men at the table and when those two men begin to look as if there were four of them, you have had a plenty.' The boy broke in with, 'Why dad, what's the matter with you? There is only one man at that table.'"

"How are you getting along with that motor you invented and told me about a few months ago," I asked.

Same hesitated a little and then said, "I got it so it looked all right on paper, and a lot of my friends I showed it to told me that so soon as I got a patent for it, I would have all the automobile manufacturers in the world by the seat of the pants and the scruff of the neck, ready for me to pitch them and their devices into the junk pile. All this rot got me pretty chesty and I determined to build a sample motor, which I did, and like the old fellow's perpetual motion device it lacked only one or two little things that I haven't got worked out yet."

"What seemed to be lacking," I asked.

"Well," said Sam, "the first thing I noticed was, that it would not run, and I have not discovered why it would not run. So soon as I find why it won't run and fix the trouble, it will be easy."

"Are you still trying to find the why," I asked.

"No," Sam said, "a man can study just so much on such a thing as that and then his mind gets tired and he might just as well stop for a while. I have been

taking a rest by getting up a cute little device for lighting auto lamps, and I want to tell you there is no hitch about that working all right, for I have tried it out to a finish without a single failure to light the gas, if the gas was there. Now I will tell you something that perhaps you won't believe until you see it. The little flash that lights the gas does not seem to have any heat. Flash it right against the back of your hand and it cannot be felt. It will not ignite the head of a parlor match, nor scorch the thinnest, driest tissue paper, yet it always lights the gas."

"Now Sam," said I, "if you had told me that the first thing when you came over here this evening, I would have thought it was due to the muddle of drink, but you appear to be thoroughly sober, and I want you to tell me how much of that smooth story is true."

"I will not tell you that any of it is true," said Sam, "for I would rather make the little trick talk than to talk myself. You will believe what it says, and perhaps you wouldn't believe all I say."

"With that he took a little insignificant looking affair from his pocket. It appeared to be a tiny wheel supported on the top of a standard at such a height that the lower edge of the wheel was about where the lower edge of the gas jet would be when the light was lighted. He took a pair of gas tip pliers from his pocket, and took a burner off a chandelier in the room, and screwed on the burner with the lighting device on it. Next he turned on the gas, gave the little wheel a flip with his finger and the gas was lighted. He blew out the flame perhaps fifty times, and re-lighted it without a single failure. Then he turned the gas off and flashed the lighter while his hand was right where the flash would hit it the hottest, so to speak, held a parlor match head where the flash would hit it, and also tried to light a dry piece of tissue paper, but the paper was not even scorched. I had Sam flash it against the back of my hand and could not feel that it was even warm.

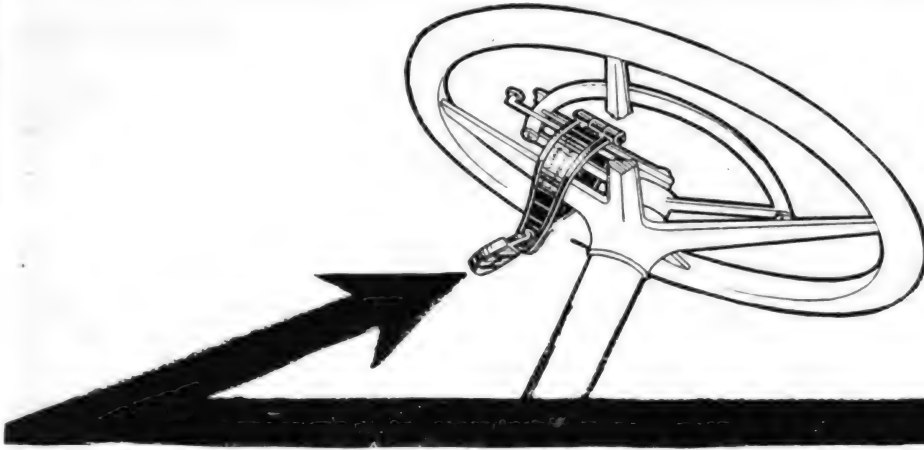
"I have tested it on auto lamps," said Sam. "in howling winds, drenching rains and blinding snow it stayed lighted every time."

"How long will it last, Sam?" I asked.

"Well," said Sam, "I fixed up a little trick to test that matter and found that it was good for more than 6,000 lightings. That will do, won't it?"

"Sold any yet?" I asked.

"Yep" said Sam in a nonchalant way, "went out on the road and sold 500 in three days, and got home to Mary at two o'clock on the third day. Had a good time but went home sober and \$30.00 profit over all expenses. I was feeling a little sorry for Mary because I knew she had a fine lot of sarcastic remarks in pickle for my special benefit. She was opposed to my going at all and predicted that it would be just \$25.00 wasted and she wanted me to remember that we just had to have a new settin' room carpet next spring. She had her day of judgment face on as I came in and commenced to uncork her vials of wrath and sarcasm, winding up with the withering clincher that all prospects for the new settin' room carpet were now to be packed away with the thousand other hopes that would never be realized. I took three \$10 bills from my vest pocket and handed them to her, saying, 'Here is the new settin' room carpet, Mary.' She looked 'em over and finally said, 'Who did you borrow them from, I want to know.' I said, I did not borrow from anyone, that \$30 was exactly what I cleared on the trip. "Then Mary went into the



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kitchen, and as I learned afterward took a little cry all by her lonesome, and then proceeded to try to get up the best supper that had ever been in the house. When I came in to supper she stood there waiting for me all fixed up in her company clothes and she stopped me and put her arms round my neck and kissed me two or three times and patted me on the shoulder and said, 'Sam, you good old darling; the best ever.' Then she let go and turned to the table and I noticed that she wiped her eyes while her back was turned to me, and I am not sure but what I took advantage of her position to give my own eyes a wipe or two."

Broken Part Record.

In general the manufacturers of any piece of machinery or mechanism know what is the weakest part. They know in a general way what parts they are called on most often to replace. No matter how well built a gas engine, a spark plug, a magneto, or other piece of machinery is, there is some part that is the weakest and usually wears out or breaks oftener than other parts. At least one of the large factories has adopted the plan of keeping a card index of the parts that are returned for renewal or repair. In due course of time there is an excellent record of the weakest parts of their machines. Careful study on the part of their engineers has frequently enabled them to strengthen parts which appeared to be giving a maximum amount of trouble. Such a method offers some excellent points for the study of one's own production, and calls one's attention almost automatically to any inherent weakness in the product. While it will usually be the case that not all of these can be remedied.

For the Kerosene Lamp.

The lighting of a kerosene lamp may be considerably facilitated, especially when a high wind is blowing, by turning the lamp wick up to the extent of half an inch or more above the top of the burner, and then turning it down again to its normal height before striking a match. The reason of this is that moving the wick up and then down in this way stimulates the flow of the oil and causes the top of the wick to become thoroughly saturated before the light is applied.

Rubber and Metal Cement.

Rubber matting may be secured to metal surfaces by using a cement made by dissolving flake shellac in alcohol to form a thick syrup. Several thin coats, carefully applied should be given to each surface, and the first should not be allowed to get quite dry before another is applied. Press the rubber carefully upon the metal and, by the use of a piece of board and rather heavy weights keep the two surfaces pressed together for about twenty-four hours.

No merchant with the eye on the future can afford to overlook motor trucks as a part of his essential equipment. As for manufacturers of motor trucks, the quicker they realize that it is actually transportation and service they sell, the greater the returns will be.

The first Knight-Daimler automobile made in England was found recently in New York still running. None of the essential parts of its sliding sleeve valve engine, it is said, were replaced since it left the plant in England six years ago.

Specific Automobile Lubrication.

An interesting and important contribution to the subject of correct automobile lubrication is to be found in a booklet just published by the Vacuum Oil Company, manufacturers of Gargoyle Mobiloils.

Following their policy of adapting the lubricant to the condition under which it operates, these manufacturers have spent considerable time studying all of the American-built cars and the foreign cars sold in this country. This investigation showed the necessity of several grades of oil to provide the most efficient lubrication for the varying types of cars. The oils are made by the Vacuum Oil Company, and a complete chart of recommendations may be had by writing them at 29 Broadway, New York. This covers all makes and models of cars made from 1908 to date.

A partial list follows: In the schedule, the letter opposite the car indicates the grade of Gargoyle Mobiloil that should be used. For example "A" means "Gargoyle Mobiloil A." The meaning of the marks is shown below the list. For all electric vehicles use Gargoyle Mobiloil A. The recommendations cover both pleasure and commercial vehicles unless otherwise noted.

Model of	'08	'09	'10	'11	'12	Model of	'08	'09	'10	'11	'12
Abbott Det..	A	A	A	A	A	Kis.-KarCom.					
Alco						Kline Kar...					
American ..	A	A	A	A	A	Knox	B	B	B	B	B
Apperson ..	E	A				Krit	A	A	A		
Atlas	A	E	E	E	A	Lambert	A	A	A	A	A
Atlas Com...	E	E	A			Lambert Com.A					
Austin	A	A	A	A	A	Lancia	B	B	B	B	B
Autocar (2).	B	A	A	A	A	Locomobile..	A				
Autocar Com.	A	A	A	A	A	Lozler	A	A			
Autocar (4).	A	A	A	A	A	Mack	A	A	A	A	E
Benz	A	A	A			Marion	A	A	A	A	A
Bergdoll						Marmon	B				
Brush	A	A	A	A	A	Matheson	A				
Bulck (2)...	A	A	A	A	A	Maxwell (2).	E	E	E	E	E
Bulck (4)...	A	A	A	A	A	Maxwell (4).	E	E			
Cadillac (1).	A	B				Mercedes	A	A	A	A	A
Cadillac (4).	A					Merc. Kght..					
Cartercar ..	A	A	A	A	A	Mercer	A	A	A	A	A
Cart'carCom.	B	A	A	A	A	Minerva Kgt.					
Case						Mitchell	A	A	A	A	A
Chadwick ..	A	A	B	A	A	Moon	A	A	A	A	A
Chalmers ..						National	A	A	A	A	A
Chase	B	B	B	B	B	Oakland	A	A	A	A	A
Cole						Oldsmobile..	A	A	A	A	A
Columbia ..	A	A	E	A	A	Overland	A	A	A	A	A
Columbia Kt.						Packard	E				
Couple Gear.	A	A	A	A	A	Panhard	A	A	A	A	A
Crox.-Keeton						PanhardKgt.					
Daimler	A	A	A	A	A	Peerless					
DaimlerK'ght						Pennsylvania	A	A	A	A	A
Darracq	A	A	A	A	A	PierceArrow	A	A	A	A	A
De Dion	B	B	B	B	B	PierceCom.					
Delahaye ..	A	A	A	A	A	Pope Hartf'd	A	A	A	A	A
Del.-Bellev.	B	B	B	B	B	Premier	A	A	A	A	A
Elmore	A					Rambler	A	A	A	A	A
E. M. F.						Rapid	A	A	A	A	A
Fiat	A	B	A	B	A	Regal					
Flanders	E	E				Renault	A	A	A	A	A
Ford	A	E	A	E	E	Reo	A	A	A	A	A
Franklin	B	B	B	A	A	Roy. Tourist.	A	A	A	A	A
Frank. Com'	B	B	B	B	A	Selden	A	A	A	A	A
Gramm						Simplex	A				
Gramm-Logan	A	A	A			Speedwell	A				
Hewitt (2)...	A	A	A			StanleySt'm.	D	D	D	D	D
Hewitt (4)...	A	A	A	A	E	Stearns	A	A	A	A	A
Hudson						StearnsKght.					
Hupmobile...						Stev. Duryea.	A				
International.	B	B	B	B	B	Stod. Dayton.	E				
Interstate ..	A	A	A	A	A	Stod. Day.Kt.					
Isotta	A	A	A	A	A	Thomas	A	E	E	E	A
Itala	A	A	A	A	A	Walter	A	A	A	A	A
Jackson (2).	A	A	A			Welch	A	A	A	A	A
Jackson (4).	A	A	A	A	A	Welch Det...					
Kelly						White					
Kissel-Kar..	A	A	A	A	A	White SteamD	D	D	D	D	D
						Winton	A	E			

* Use Gargoyle Mobiloil A in winter
 † Use Gargoyle Mobiloil E in winter
 ‡ Use Gargoyle Mobiloil Arctic in winter
 § Use Gargoyle Mobiloil Arctic

For the Automobile Horn.

A speck of grit in the reed will render the action of a horn erratic, or put it out of operation altogether. In such a case the reed should be taken out and a piece of thin paper passed under its tongue, taking care not to bend the tongue, which would have the effect of altering the tone of the horn or preventing its working at all.

STEAM CAR DEPARTMENT

This department is intended for owners, users and others interested in the steam car.

Those who have trouble with their steam cars are asked to give clear and full particulars, and their queries will be answered as correctly as possible by an expert. It will be considered a favor if our readers will contribute to this department, giving such information as may be useful to others using the steam car.

More Good Steam Car Reading.

From C. H. Dresser, Connecticut.—Let us hope that there was no general disappointment among the steam car men at the appearance of that long expected dissertation "Good Reading for Steam Car Owners," which appeared in your February number. We were led to believe (at least some of us) that a careful perusal would cause all our troubles and cares to vanish into thin air, and then in the opening sentence to have Mr. Hill frankly state that he "knows next to nothing" regarding steam cars is rather disappointing, and the more carefully we read his letter, the more firmly we become convinced that he is telling the truth. Some old-fashioned people believe that it is well to have at least a slight knowledge of your subject before starting out with advice, discussion and criticism, and if we started to relate all the stories "a man told us" relative to antiquated cars (both steam and gasoline) that ought to be in the scrap heap, I am very sure your popular magazine would soon be a thing of the past. It is also to be supposed that any man who knew enough to ache when he was hurt would prefer a new Packard to some ancient vintage of a steamer. Let us drop such unjust comparison and come down to the later models of Stanley cars, for the writer knows nothing of any other steamer, though his first year's experience was with a new gas car of popular make, but that is another story. The first hunk of wisdom we receive from the pen of Mr. Hill is that "Steamers are not as economical in operation as gas cars." Why? Because if you use it three times a day you have to "get up steam" that same number of times. Does Mr. Hill suppose that the steam drops from 600 or 700 pounds to nothing whenever the car is stopped for a few hours? I sometimes wonder if the Stanley men laughed or swore when they read that.

Then, next comes that most rapacious of all things, the pilot light with its insatiable maw, ever and ever asking for more. With all due respect why does not Mr. Hill or Mr. Wight address a letter to the manufacturers at Newton, Mass., and they would tell them truthfully regarding that outlay. My experience has been, after two years usage, that I cannot burn one pint of gasoline via the pilot light over night. Cost about 1½ cents. If that stood in the way I should feel like selling the car and buying a wheelbarrow or baby carriage.

Then we are told that the steamer is "much heavier" than the gas car. Let us sift that vague statement and see where we are at. Some of the small gas cars weigh as little ten or twelve hundred pounds, from that to probably fifty or sixty hundred for the big ones. The Model 70 Stanley Steamer is made to, and seats comfortably, five persons, the rear seat being 48 inches wide, wheels 4x36, wheel base 115 inches, the catalogue weight is 2,200 lbs. Add 200 lbs. for good measure and you have 2,400 lbs. Now

ALLEN

Keep your tires properly inflated. You can't expect resiliency and long life if you don't keep them inflated at right pressure.

ALLEN TYROMETER

THE PRESSURE GAUGE

tells you the exact air pressure in your tires. Indication is immediately shown and held by sliding band until you release it. Handsomely finished—4½ inches long. Has clip-cap and can be carried in vest pocket like a fountain pen. Price \$1.00 at your dealer's or from us.

Allen Tire Covers

On all good cars you find ALLEN Tire Covers. They protect your extra shoes from rain, mud, gasoline and oil. Made of best enamel duck in all colors and color combinations.



THE ALLEN AUTO SPECIALTY CO.

1926 Broadway, New York.

CHICAGO BRANCH FACTORY: 1436 Michigan Ave.

IRVIN SILVERBERG & CO., 541 Van Ness Ave., San Francisco, Cal.

please tell me how many gas cars of less weight (and cost) will get to the top of a good stiff hill ahead of that Stanley steamer? All we know is that around here no man tries it the second time. There is no question but what the Stanley steamer has more power than any gas car of its weight. Tires depend wholly on their make, care, usage and speed, as has often been explained. As you cannot "jump" a steamer in starting it or in changing speeds, we think that fact favors the tires, but much depends on the man at the wheel. Some people seem to think it necessary that one class of car should drive the other out of existence. In the humble opinion of the writer that is not necessary and will never occur. Gas cars are as well made as money and inventive ability can make them, and have come to stay with the great majority of users, and will always far outnumber the other class. Their defects can easily be learned by reading the Trouble Department in your excellent magazine, that speaks for itself and further remarks are unnecessary. By the way, how many complaints do you have from steam car owners who are using recent models?

The steamer can never take the place of general and promiscuous use now occupied by the gas car, where all that is necessary to make them go is to jerk the crank and manipulate two little levers. The steamer requires study and a thorough acquaintance with all working parts which are comparatively few and easily accessible. It never develops those mysterious defects and balky complications so expensive and exasperating in the other car.

Those who are driving recent models of the Stan-

ley steamer, and have taken time to know the car, feel comfort, satisfaction and friendship not readily described. Its easy riding motion, absence of all jumps or jerks—as there is no change of gears—rhythmic motion of its little engines, making only 390 revolutions per minute at 30 miles per hour, is always a pleasant sound. Oiling troubles, there are none, and expense of same mighty small, and greatest of all, its magnificent power which will take you through anything or over anything without grunt, groan or tremble, is greatly appreciated by all users of the machine, and will burn no more gasoline than other cars of equal power.

A few words relative to that 53 mile gait—with nine passengers—and up hill at that. Why do otherwise sensible people boast (and the steam car men are not exempt) of such lawless, reckless, criminal performances which are directly opposed to all legislation, decency and the rights and safety of others? It is safe to say that such dare devil speed on a public highway is responsible for all adverse legislation, spleen, hatred and acrimony so often displayed to the motorist. It is equally safe to say that it is also responsible for 99/100 of all accidents which reap such a terrible toll of life and property. Why otherwise careful people persist—until the grim reaper gathers them—in such a foolhardy performance is beyond my ken.

All autoists should exhibit careful consideration for their guests, the road, their car, and above all be gentlemanly and kind, never omitting careful consideration for all other users of the road.

Modest speed enables one to enjoy the country to the fullest extent, and now that nature is appearing in her new robe, let us travel so we may see all her fresh springtide beauties, the rugged mountains and babbling brooks, budding orchards and fragrant flowers, our feathered friends and furry companions, and thus get back near to mother earth, and travel so it will not be necessary to engrave on our tombstones "killed in an auto accident."

Note by the Editor.—Our friend writes with so much logic and breeziness that it makes good reading although we somewhat regret he indulges in the fault that besets most of us—a little pungent prejudice. He asks one or two questions which we will make an attempt to reply to. The reason why the steam car gets little attention in our Trouble Department may be because there are few of them in use and they seem to be growing less in proportion to the whole in use. Now as to weight: We don't know the weights of all or of many, but here are the weights of a few gasoline cars: Cartercar (4 passenger) 1,900 pounds; Ford (6 passenger) 1,200 pounds; Kearns (4 passenger) 1,400 pounds; Duryea (4 passenger) 850 pounds; Kenmore (5 passenger) 1,200 pounds; Krit (5 passenger) 1,800 pounds. But the full list of light weight cars would be too long and we are not perfectly familiar with the whole.

Would it not be better if our steam car friends were to not indulge in so much comparison but would resign themselves to conditions as they exist, whether the steam car is better or worse than the gasoline car? It reminds us of the story: Some one wanted to express sympathy for a German whose wife had just died. "Was she resigned?" he asked. "Jiminy," replied the Teuton, "she had to be; she couldn't help herself." This is something like the automobile situation. The steam car is going out and the gasoline car is coming in. Whether it is right or wrong does not help the matter; we can't help ourselves.

White Steamer Points.

From J. J. Davis, M. D., Texas.—In reply to E. A. Lee, Colorado, I will say that I cleanse my White generator by the following method: Scale in the generator is mostly carbonate of lime. Therefore mix $\frac{1}{2}$ gallon of commercial muriatic acid with $1\frac{1}{2}$ or 2 gallons of water, or if slow action is desired, 1 gallon of acid to 6 of water, in a glass or earthenware vessel. Disconnect the feed water pipe at the hand pump. Hang an ordinary fountain syringe on the steering wheel and insert the nozzle of the syringe into the generator end of the disconnected pipe. Have the generator full of water. Fill the syringe with water. Open the blow off valve on the steam line. Pump one-fourth of the water out of the syringe with a hand pump. Fill up again with acid solution. Pump half out. Refill with the acid solution. Pump out and refill with acid. Use the acid solution till the water coming from the blow off valve does not foam and tastes acid. Pump in pure water till the acid is flushed out. Dissolve 1 pound of cooking soda in 4 gallons of water. Pump through to neutralize the acid. Pump pure water through till the soda is all out. Fire up and run the engine for a short time. Be sure the blow off valve on the steam line is open. Be sure all the acid is neutralized or flushed out.

In the October issue I see an inquiry as to why Model "O" White Steamer uses so much water. My experience with Model "O" is that the principal leakage is in the piston valves. If, on turning on the steam, you can hear the steam gurgling back into the water tank, you have pistons or valves, or both, leaking. Take the aluminum cover off of the cylinder head, unscrew the plug immediately above the piston valve. Raise a few pounds of steam. Jack up one rear wheel and throw in the gear. Open the throttle slightly and have someone turn the rear wheel to move the engine. By watching the valve you can see any leakage. The pistons can be similarly inspected.

The White Company think I am the only one preferring slide valves, but I am absolutely unable to keep the piston valves from leaking. The only way I have found to repair them is to send them to the factory or to some special machine shop. One reason the White is not more popular here is that we cannot get a price list of parts. You can see the disadvantages—and they are many.

If someone would give specific changes needed for making Model "O" burn oil instead of gas I think your readers would appreciate it.

Stanley Backfiring.

From P. S. Waite, Massachusetts.—In answer to Chas. Green's inquiry in the March number, I should think from his description that his backfiring was caused by a defective bottom lining on the burner casting. If the burner casting is in good condition a new lining can be applied, though the pan and mixing tubes will probably be spoiled in getting them out and will have to be renewed also. Even so, if the casting is good, the burner will be as good as new at less than half the cost of a new one complete. But he had better send the defective burner to the factory for repairs or renewal as they see fit, unless there is some one nearer who understands the job. Backfiring in Stanley burners may be caused by many things among which are: A leak in the boiler tubes or superheaters; a cracked burner casting; defective bottom lining of burner casting; a burned out mixing tube; asbestos loose or gone around the top of the burner pan allowing fire to get back through the opening to the vaporizer nozzles; the vaporizer nozzles partly stopped up. By taking off the burner when there is a

good head of steam on, the tubes can be examined. Now block the car and open the throttle to test the superheaters for leaks. Cracks in the burner casting can readily be seen. It takes quite a large crack to cause much trouble. The bottom lining of the casting cannot be seen, but if the burner is old and no other reason appears for the backfiring, it is pretty surely this lining.

The Stanley Running Cost.

From O. W. Canright, Wisconsin.—In your March issue Charles Green, Michigan, spoke of trouble he had been having with the fire of his Stanley Steamer. We had the same trouble with our car. It may be caused by leaky super-heaters, leaky boiler or dirty burner. If a crack between boiler and burner is not plastered shut, a slight popping might also be caused. Super-heaters may leak at the joints where welded together or at places where driven in the boiler. If not in tight enough, tap with a hammer. In all probability your trouble is on account of a leaky super-heater. To find the leak steam up with about a hundred pounds, let the car run against an immovable body and open the throttle. With the burner off the leak can be found as pressure is then on the super-heater. I would like to hear from some Stanley owners as to their expense account, tires, oil, etc., included, also state mileage obtained.

Kerosene Burners.

From A. N. Henshaw, New York.—Kerosene is a cheaper fuel for steam cars than gasoline, costing less and giving more mileage per gallon. It is also safer in one respect, that unlike gasoline it gives off no inflammable vapor except when heated, and is therefore far less apt to take fire when spilled. But the very quality which makes it safer in this respect makes it less safe in others, for instead of evaporating at once, like gasoline, it lies where it falls, or soaks into woodwork and renders it more or less inflammable for days. Furthermore, it is a far more delicate problem to vaporize kerosene and keep it vaporized than gasoline. If kerosene is heated in the vaporizers above a certain temperature, or cools slightly after vaporization, the burner-tips and sometimes the vaporizers become choked with a hard, stony deposit in the one case, with a viscous substance like tar in the other. Let us consider what might happen if the pilot becomes slightly clogged, so that it no longer heats the main vaporizers sufficiently, but still continues to burn. Suppose that the car is descending a hill, and the automatic cuts off the main fire. At the foot of the hill the automatic releases, and the burner is flooded with unvaporized fuel, which is finally ignited by the smouldering pilot. The effect is more or less spectacular, though not necessarily dangerous. With the easily vaporized gasoline such a thing seldom, if ever, occurs, though an inexperienced operator might find it not unusual with the less volatile kerosene. Some avoid the risk altogether by installing a separate pressure tank, and burning gasoline in the pilot and kerosene in the main burner.

There are various kerosene burners on the market, some of good design and good workmanship, some of poor design and good workmanship, and some poor in every respect. The writer knows of one which is accompanied by a printed description and directions full enough and plain enough to show the beginner just what to do. The following is from a letter writ-



Inside this Can

is the secret of an always-clean, new-looking automobile.

Every autoist takes pride in his car. Likes it to "look new." Likes to see it shine.

Mobo is the one soap that washes off all dirt and grease, and positively will not injure the richest finish.

If you use Mobo, you can have your car always clean and bright.

Can't clean it by merely washing it. The alkali in ordinary soap dulls the gloss, cracks and blisters the varnish.

Mobo is just right. A pure linseed-oil soap that cleanses. Preserves the paint and varnish.

It's easy to use—pail of water and a sponge are all you need with Mobo.

Sold in small and large cans, half barrels and barrels by all supply dealers.

Use

MOBO
AUTO CLEANSER

JOHN T. STANLEY
Maker of Fine Soaps
644 W. 30th St., New York City
Write for Booklet "How to Keep an Automobile Clean and Bright," sending us your Dealer's Name.

ten by one who has used this particular burner for four years, and discusses it impartially:

"I find it a good burner, but not free from trouble, as there are little things that arise from time to time that would not occur in a gasoline burner. The cost of operating is just half. The pilot has to be taken out and cleaned every morning before firing. If the pilot is too hot or too low, it forms carbon; it has to be just right, and it takes some time to learn it. Again, if by accident it should go out on the road from a little dirt it is very hard to light; but after you have mastered it you would never use gasoline again." The burner is made by the Judson D. Thomson Company, Waltham, Mass., and is called the National Kerosene Burner.

The Stanley Boiler and Oil.

From Dr. William Haverkost, Pennsylvania.—Say to Mr. Bert Foster of South Dakota that he can buy the best and most suitable boiler for his Stanley car from the Stanley Company of Newton, Mass. This boiler will go right in place without any changes and will have a guarantee of two years against defects. He can also get the sight feed oiler from the same place. Better send for their illustrated price list which lists every part on the car with prices. The best oil for the Stanley car is No. 302 Superheat Steam Oil. After three years' use in my steamer, I can recommend it. I lubricate the whole car with it and have good satisfaction:

If you add new accessories be sure they do not bring the weight of your car above the weight your tires are designed to carry.

Vulcum Tire Repair Process.—The question of tire repairs is a pressing one, to every motorist, because a large part of the expense of running an automobile is in connection with the tires. One of the best methods of repairing tires is said to be the Vulcum Tire Repair Process, materials for which are manufactured by the Richardson Tire Company of Hartford, Conn. The manufacturers state that this is a thoroughly satisfactory tire repair outfit, that it will do the work, is simple and easy, is bound to stick and no acid or heat is required. Many who have used



the Vulcum Tire Repair Outfit have sent in repeat orders. The outfit is very complete, including a softener for softening the rubber and a hardener for the finished repair. Preparations are now being made to sell this outfit extensively in foreign countries as well as in the United States and it is admitted by all that Vulcum has been one of the hits of the present automobile season. A complete outfit, sufficient for 50 guaranteed repairs, will be sent to any reader for \$2.00 with a strong money-back guarantee, the only condition being that you mention this publication and write to Vulcum Manager, Richardson Tire Company, Hartford, Conn.

H. W. Johns-Manville Co., makers of asbestos, magnesia and electrical supplies, has moved from 100 William Street, to a new twelve-story building, corner of Madison Avenue and 41st St., New York City. This company has factories in Brooklyn, N. Y.; Milwaukee, Wis.; Hartford, Conn.; Nashua, N. H.; Lockport, N. Y., and Newark, N. J. The company employs a force of about 5,000 people and has 425 salesmen. The writer of this notice was personally acquainted for many years with H. W. Johns, founder of this business, who started at 87 Maiden Lane.

A Handy Vise for the Garage.—We illustrate in our advertising columns this month a new drill press and milling machine vise, manufactured by the Hub Machine Welding & Contracting Company, 621 Cherry Street, Philadelphia, Pa. This vise is made of cast iron with a steel screw. It has a $4\frac{1}{2}$ inch jaw, $1\frac{3}{4}$ inches deep which open $4\frac{1}{4}$ inches. The weight of the vise is 15 pounds and it is extremely useful in any automobile repair shop. It is sold for \$3.50, f.o.b. Philadelphia, and mail orders are invited. Write for circular and price list to the manufacturer and mention this magazine.

Ford Bumpers.—In this issue the Standard Brass & Iron Works, of Milwaukee, Wis., have an announcement of the Ford Bumper, which will interest owners of Ford cars. The same concern manufactures the Bond Auto Bumper, a practical and simple device, sold at such a low price that every car owner can afford to have one. Write for descriptive circular and prices, and mention the Automobile Dealer and Repairer. The Improved Standard Direct Bumper can be used on almost any car.

Dealers and repair-men are requested to send for special trade discount.

The A B C of Lubrication.—Good smooth running in an automobile engine is largely dependent upon the maintenance of good lubrication. Poor ignition or carburetion give ample warning of existing conditions, so the trouble is quickly diagnosed and remedied in the majority of cases, but faulty lubrication goes quite unnoticed to the average driver. So the coming plea is for "efficient lubrication" and a thorough reading of this will help and add to the joy of your coming season. For force-feed and splash systems an oil of light body is the one oil that will give satisfaction. Look for the oil that is made from Pennsylvania crude—has been filtered to remove the greatest part of free carbon—and at the same time has not been filtered to such an extent as to "kill" the viscosity and lubrication qualities. For the coming warm weather season an oil of a bit more body will be desirable. The heavy demand the motor industry has placed upon gasoline production has been the cause of an immense increase in the marketing of inferior and poor volatile oils of a low gravity test. They cause untold damage in the engine and the results are frequently laid at the door of the lubricant—when such is not the case. Summing up—get the best oil. Poor oils save money, but you'll find engine repairs a bit more costly.

R-C-H Service Stations.—A chain of service stations for the convenience of its numerous dealers throughout the United States and Canada, is to be installed as soon as possible by the R-C-H Corporation. The plan at present is to establish one of these stations in each of the cities in which a branch is now maintained, viz.: Detroit, New York, Boston, Philadelphia, Chicago, Denver, Atlanta, Buffalo, Cleveland, Minneapolis, Kansas City, Los Angeles. In each station a complete stock of parts will be carried and any calls for replacements, instead of coming to the factory, will go direct to the service station covering the territory in which that part is needed. In this manner, it will be possible to meet any demand from any part of the United States or Canada within a few days. The first of these stations is already in operation in Detroit, in an elaborately equipped building, 124x60 feet, of brick and concrete, trussed steel construction.

Webster's International Dictionary.—G. & C. Merriam Company of Springfield, Mass., have recently brought out a new edition of Webster's International Dictionary, the only new unabridged dictionary in many years, they say. It defines over 400,000 words and comprises 2700 pages with 6,000 illustrations. Specimens of this dictionary with full particulars will be sent to any reader who will write for them and if you will at the same time mention the advertisement of this company in the Automobile Dealer and Repairer, they will send you a set of pocket maps free.

Valentine & Company, the varnish manufacturers, have an idea that by co-operating with the local man they can benefit him and themselves at the same time, and they have begun a campaign of advertising service, which is furnished free to any of their customers who desire it. A series of advertising plates for use in local papers, a series of

handsome art blotters, imprinted with the local man's name and a series of booklets are furnished by them. Newspaper ads, blotters and booklets have all been prepared by an expert advertising man with many years' experience in the varnish business. They contain only an incidental mention of the Valentine line of varnishes and are in every way an announcement of the local man. This experiment of Valentine & Company is being watched with considerable interest. The ads are appearing in the local papers all over the country. The blotters are now in preparation and Valentine & Company announce that they will be glad to send them out to anyone who wants them. The booklets are also ready.

"Business Growth."—Ground has been broken for a new building to be erected as an addition to the factory of the Marvel Carburetor Company located at 2230 Almont St., Indianapolis, Ind. The fast increasing business of this company has made this necessary and when the improvements are completed their force of men will be increased to three or four times the number now employed. The carburetor, the Marvel Carburetor Company manufactures, is covered by a number of patents which embrace several exclusive and distinctive features, and their claim that the Marvel Carbureters will handle low grade gasoline under any and all conditions seems to be well founded by the number of orders they now have. They are developing a small carburetor for motor cycles and also two larger racing type carbureters. These models will be ready for the market in the near future and will embrace a number of improvements over their present device, and will have considerable more capacity than anything the Marvel Company has built heretofore. A large number of factory contracts have been secured and several additional contracts are offered them.

Lights Lamps Without Matches.—A little device has been invented that without matches or electricity lights automobile lamps in wind, snow or rain. Moreover, there is no danger from fire for it will ignite nothing but gas. It is neat in appearance and does not obstruct the light. Take off the old burner, screw the new one in its place; turn on the gas, give the little wheel a quick twirl with your thumb and the lamp is lighted. The burners furnished with this device have no arms to interfere with the reflected light. They give more light for the amount of gas used, because they make a better air and gas mixture. There being but one gas outlet, the hole is twice the size of holes in a two-hole burner, and less liable to get clogged. The tip is non-porous as glass; cannot absorb oily carbon or other products of combustion. These burners cost more than other burners, and are really worth a great deal more. They cost the dealer \$3.00 per dozen and cost the car owner 35 cents each. The combined burners and lighters cost at retail \$3.50 a pair and are made by the Auto Gas Lighting Co., Fountain City, Ind.

Send for free sample of The Automobile Dealer and Repairer.
MOTOR VEHICLE PUBLISHING CO.,
71-73 Murray St., New York.

The Backfiring Burner.

From Dr. William Haverkost, Pennsylvania.—Say to Mr. Chas. Green, Michigan, that the backfiring in the burner of his Stanley car is caused by one of three things, which he will have to find out by examination. First, it may be caused by the fire leaking out around the edge of the burner and catching the gas as it shoots out of the nozzles outside of the funnels. This can be remedied by stopping the joint with asbestos. See that all joints are tight around the pilot and burner nozzles. Second, it may be caused by a cracked vaporizer tube inside of the burner, allowing the gas to escape into the fire before it reaches the nozzles. This can only be repaired with a new vaporizer. Third, it may be caused by a leaky boiler flue or flues which start to leak water into the fire when the steam pressure gets to a certain point or if the car is running and using steam it can be caused by a cracked superheater, as Mr. Green doesn't say whether he is running or only firing up. I take for granted his trouble occurs while firing up and if he will shut off his fire when his steam reaches the pressure at which the burner backfires, and while the steam pressure is on, take down the burner, he will be able to see whether the trouble is caused by leaky flues or superheater. If the flues leak they must be expanded to make them tight, and if this cannot be done, plugged at both ends, a half inch bolt filed to an easy taper makes a good plug. If the superheater is split a new one must be put in. In over five seasons' use of my Stanley car, I have never had but one backfire and that was caused by a bursted superheater while running the car on the road. I stopped and took out the defective pipe, put a new one in which I always carry along, and fired up anew and went on my way rejoicing.

The Stanley Water Indicator.

From Henry S. Tierney, Connecticut.—Regarding the inquiry of Dr. Dysart in a recent number on the water glass question, would say I ran a Grout car five years with a Klinger glass and broke two or three. The trouble with them is that they have to be packed quite frequently as they start leaking on the top end, the packing burns out with the action of the steam at 300 pounds, and if they are allowed to continue leaking will ruin the glass by erosion. A friend of mine had a Seabury glass on a car carrying 250 pounds of steam and he found it worse than useless; he was continually replacing broken glasses and finally discarded the Seabury for a Klinger and had no further trouble. I am running a 1911 Stanley with their water indicator and I like it much better than a glass under pressure. The only drawback is that you do not get an indication standing still. The remedy for that is place a tee in water column and use the gauge cocks when in doubt about your water level. After my experience with the present Stanley water indicator I would hate to go back to glasses under pressure.

Sagging frames and bent and flapping mud-guards are as nothing for indicating disreputable condition as compared to a hood that sags and straggles any old way between the radiator and the dash.

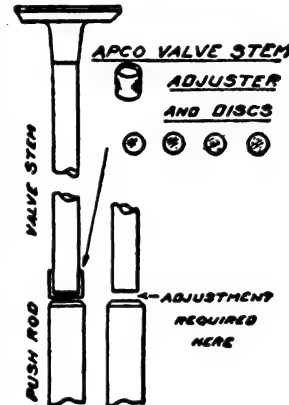
Owners of closed cars sometimes are surprised to find that the upholstery has been attacked by moths. A thorough brushing of all the upholstery with an ordinary whisk-broom is the most reliable preventive.

FORD OWNERS



VALVE STEM ADJUSTERS

PATENTED



Will make your car run as quiet and smooth as an electric. There is a certain time for the valves to open, and if they are late, even a fraction of a second, the motor will lose power and become noisy.

The APCO Adjusters can be put on your motor in half an hour and wear on the valves can be taken up at any time by simply putting a disc under each valve stem. To apply, raise valve and slip adjuster on end of stem. Insert discs until proper adjustment is obtained. Held in place solely by friction. All the high priced cars have this adjustment. If you have a 22 H. P. motor don't be satisfied with 15 H. P. Put them on your car and if they are not perfectly satisfactory, return the set and we will gladly refund the purchase price. State diameter of valve stem when ordering. Set includes eight adjusters and discs to take up wear as occasion requires.

Made for 5-16 in., 3-8 in., 7-16 in. valve stems.

The price is nominal, the improvement phenomenal.

PRICE \$1.50 PER SET



OIL GAUGE FOR MODEL "T" FORDS



Take the place of the lower pet cock on the Model T Ford and tells you at a glance just how much oil you have. Eliminates smoke, carbon, pitted valves, etc., all caused by excess oil. Can be put on your car in ten minutes and will last a lifetime. Saves its cost in oil the first month. 50,000 now in use. As necessary to the car as hands to the clock.

PRICE \$1.00 PREPAID

Twenty other Specialties for Ford Cars, carried in stock by most Ford Dealers. :: Free Catalog

AUTO PARTS CO.

Ford Dept.

Providence, R. I.

A Cyclopedic of Automobiling. Published by the American School of Correspondence, Chicago, Ill. Four volumes, 1400 pages and 1200 illustrations.

An important and timely contribution to the literature of the automobile has just appeared in the form of a beautifully bound, well printed and lavishly illustrated work of four volumes, entitled the Cyclopedic of Automobile Engineering, published by the American School of Correspondence of Chicago, Illinois. The dearth of authoritative literature relating to the several fields of engineering that are broadly compassed under the above heading has been often commented upon by engineers, and lamented by students and others. To quote from the volumes themselves:

"With regard to no other field of engineering of similar importance—in which there is invested anything like a similar amount of capital, or in which there are anywhere near as many people interested—is there such a lack of correct and authoritative literature as in the automobile field?"

"This undoubtedly is due to two conditions that have been involved in the rapid growth of the automobile from a mere experiment to an achieved fact. First of these conditions is that the men who have most studied the automobile from an engineering standpoint, and who are best informed about it, have not the time to place upon paper the facts with which they are acquainted. The second condition has been the lack of time for the establishment of a formulated science, founded upon tabulated knowledge, upon which to base textbooks of genuine and permanent authority."

This situation seems to have been adequately met by the authors of the new Cyclopedic, who have collaborated in the production of a work that for both reference and general reading must inevitably find a high place in all well-supplied libraries, and stand a credit to the specialists who are responsible for it.

Commencing with Volume I, there are first introduced the fundamentals of internal combustion motor operation, clear, simple and full explanations being provided. Then follows a section in which there is fully treated the general design and requirements of modern motor cars, with special reference to the most recent and important developments. Then come closer details, and accurate and specialized information, useful to the engineer and repairman without being uninteresting to the layman. "Electric Automobiles" is a special section devoted to their design, construction, operation, care and maintenance. An example of the thoroughness with which this subject is treated is the up-to-date and accurate data relating to the latest type of Edison storage battery. "Steam Automobiles" is another specialized section, completely covering a type of vehicle that, while it is not the most important, is nevertheless of much interest and some promise. "Types of Automobiles" is a discussion by an eminent authority of the development of the automobile to its present form, with exhaustive consideration of the factors that have so far controlled the evolution of the motor vehicle and that may be expected to determine it in the future. In the concluding section, under this heading, is some very interesting material for the man about to select a car. "Motorcycles" is self explanatory,

and neglects nothing from carburetors to transmission. Volume III is introduced with a chapter on commercial vehicles, which are exhaustively discussed. "Private Garages and Repairs" is of a special interest to the owner and the chauffeur, besides including much information about garage architecture and equipment and repairs and overhauling that can reasonably be done away from a fully equipped repair shop. "Automobile Driving" is of prime interest and no one who reads through this portion of the text carefully can finish without a very definite idea of the essential requirements and the points to be observed in becoming a competent operator of a car.

"Motor boats" is another example of how completely all types of motor vehicles are treated, even including rules of navigation.

Volume IV is entirely devoted to the aeroplane, and no more complete or informing treatise on the wonderful flying craft of modern times has yet been produced. The information throughout is up to the minute.

The four volumes total 1400 pages, with 1200 illustrations, and the reader's progress is greatly helped by a closing section in each volume of "Review Questions." There also is an excellent glossary of motor vehicles and aviation terms, and an unusually complete index.

A New Tire.—A new tire has recently appeared on the market which is intended by its makers to solve the tire problem for owners of light pleasure cars, light delivery cars, light trucks and similar gasoline-propelled vehicles and all types of electric cars. The Ferromatic Tire consists of a metal shell in two separate parts or rings. The outer shell is covered with a solid rubber tread of ample thickness, which is furnished in both the plain and non-skid types. Between the outer and inner metal shells are placed from five to eight diagonal vanadium steel helical springs, which hold the two shells concentric under ordinary conditions. The give-and-take of the many diagonally placed springs enables the tire to take up all shocks due to rough pavements and uneven road surfaces, while the even distribution of the jar over the total number of springs eliminates all bouncing. Many advantages are claimed for this tire. In appearance, when on the car, it differs very little from the ordinary tire and it is claimed it gives the car owner the maximum of safety and economy, while at the same time giving his car resiliency and easy-riding qualities equal to those produced by the car fitted with pneumatic tires and shock absorbers.

A company has been incorporated with a capital of \$180,000, under the name of the Ferromatic Tire & Manufacturing Company of Kansas City, Mo., and Cleveland, Ohio, to manufacture this tire, and it has already secured extensive distribution throughout the West and is at present engaged in a campaign for dealers through the Middle West and Eastern States. Dealers for Ferromatic Tires will be given the exclusive agency in their particular localities.

The First Test of that section of the automobile law of Massachusetts which prohibits the use of a horn making a harsh, unreasonable or objectionable noise, was made recently in the Municipal court in the City of Boston. The first case to be heard was that against

a chauffeur, and while it must be said that the case might possibly have ended differently had he been represented by skillful counsel, nevertheless, the court decided that the use of that horn came within the prohibition of the statute and the defendant was fined \$10, which he paid. There were two other cases both of which were against persons who had used the Jericho horn, and although under the handicap of a precedent established in the first case, counsel succeeded in convincing the judge by explaining the difference in the mechanical construction and operation of the two horns, that the Jericho horn did not make a harsh, objectionable or unreasonable sound if used while an automobile was going from eight to twelve miles an hour as was testified to in the case before the court, and the defendants were discharged.

Tools for Vulcanizing.

Users of portable vulcanizers as well as repairmen will appreciate this kit manufactured by C. A. Shaler Co., Waupan, Wis. The eight tools have been designed with a view of utility and each one has a definite purpose in the preparation of a tire repair. If purchased



separately, the tools would undoubtedly cost more than \$2.50, the price of the outfit, which includes a neat Chase leather roll. Though originally marketed at an unusually high price, for the benefit of users of Shaler Vulcanizers, it has been put on the open market after many requests from garages and motorists who appreciated the need of an outfit of this sort.

Protection Against Car Robbers.

Everybody knows that a new field for thievery was opened when the motor car became popular. Unguarded cars are stolen somewhere, more or less of them, every day in the year. It is said that over 5,000 car owners suffered last year and this sort of robbery is not going to stop. Why not protect your car when it can be done at the trifling cost of \$2.00. See the full page announcement in this issue of S. Breakstone, 1712 Michigan Avenue, Chicago, Ill., and if you want the "Watch Dog" lock, cut out the coupon printed in his advertisement and send it to him with a check for \$2.00, or a remittance in any convenient way, and it will be promptly forwarded to you.

New Rotary Valve Motor.—The Vixen Motor Company has recently been incorporated in Indianapolis to develop and control the rights of the Vixen Rotary Valve Motor, designed and built by Charles M. Mayers and Edgar C. Haupt. The initial engine, which has been in operation for some time, has recently been given a road trial in the Cole "Speedster." Its performance has been so unusual and satisfactory that no changes will be made in other engines contemplated further than in dimensions and refinement of design.

STEAM CAR REPAIRS.

How They Compare With Those Necessary on a Gasoline Car.

An owner of a steam car and a strong partisan of this kind of vehicle makes the following comparison of their repair in connection with gasoline cars. In the first place, he says, the steam car, possessing nearly 50 per cent. less working parts than a gasoline car of equal power, cannot naturally require so many repairs. Dealing with the chassis which is common to both types of vehicles, the repairs may be taken as being equal, although as there is no clutch, and therefore no possibility of applying the power suddenly or jerkily to the rear axle, the repairs to this part are considerably less on a steam car than on a gasoline car.

The special points are the generator or boiler, burner, and engine. The generator, barring accidents, lasts out the car; many cars are running now with generators that have been in use since the cars were built nine or ten years ago, and which are likely to last as long again.

The burner, not being a working part, never wears out, but on some cars a new vaporizer, which is cheap and easily fitted, is required occasionally. A burner may be broken in accident or by carelessness, but is otherwise everlasting. Many of the steam car engines now have ball bearings, and the same remarks apply to these as to those on the chassis. The reboring of cylinders and grinding in of valves are common to both cars, but very seldom required on a steam car, and there are then only two cylinders to rebore as against four or six on a gasoline car. There are neither gear box, clutch, nor ignition gear, so these do not have to be considered. Every repair that it is possible for a private owner to do to a gasoline car can be done to a steam car, and it is certain that any firm who could not repair a steam car is not to be trusted with the repair of a gasoline car.

The conclusions therefore are: (1) That there are considerably less repairs and spare parts required with a steam car. (2) That the repairs are no more difficult than those to a gasoline car.

Replacements Easily Made.

The user of a steam car is not tied to the makers to the same extent as if he had a gasoline car, as many parts are quite easily made, as, for instance, a new piston rod, which is merely a length of steel bar turned to fit the piston and crosshead. At the prices at which these are sold by the makers of cars, it would not pay the owner to make them, but in the event of it being impossible to get them from the makers, as in the case of a car in use in the colonies, the parts can be very readily made.

For a steam car to be able to do its best work, it is absolutely essential that the fire must be powerful enough to overcome the water, however rapidly it may be supplied to the boiler or generator. In a car fitted with a boiler, as in the Stanley, the fire should be of sufficient power to enable the car to be driven up a steep hill at high speed with the pumps full on, and maintain a full head of steam, the engine being in good order. In a car fitted with a generator as on the White, the pressure is not so important as temperature. On the White cars a thermometer or pyrometer is fitted on the steam pipe, and shows the temperature of the steam. The burner should be capable of maintaining this at the desired degree, no matter what work the car is doing.

You Want the Best tire proposition on the market DON'T YOU?



Then Buy Great American White Wrapped Tread Tires and Tubes

Cost 15% LESS THAN OTHER
STANDARD MAKES

Because we have eliminated expensive factory branch salesrooms and mileage insurance.

Tests Prove that the construction of Great American Tires produces greater mileage than the average 3,500 mile guaranteed tire. Doesn't over 15% Saving In Hard Cash Appeal to you?

Order Today

Deduct 5% for cash with order.

Great American Tires Are Honestly Made

We want your present business and all your future business.

Guaranteed standard construction and against defects in manufacture.

It is to your advantage to write us for all the facts about

Great American Tires

Great American Rubber Co.

Conshohocken Pennsylvania
Address Sales Office, Dept. 7

DEALERS:—Our policy is no factory branches but loyal and satisfied dealers. Our proposition relieves you of all the inconvenience and expense of readjustments. Great American Tires and Tubes are built honestly and make permanent and satisfied customers. Write for our profitable proposition to you.

Plain Gray Red Tread Garco Garco Tires Tubes Tubes

28x3.....	\$11.60	\$2.85	\$3.50
30x3.....	12.40	3.10	3.75
32x3.....	13.30	3.30	4.05
30x3 1/2.....	17.35	4.15	5.10
31x3 1/2.....	17.85	4.25	5.15
32x3 1/2.....	18.40	4.35	5.35
34x3 1/2.....	19.95	4.65	5.65
30x4.....	24.60	5.10	6.45
31x4.....	25.60	5.25	6.75
32x4.....	26.60	5.35	6.90
33x4.....	27.45	5.60	7.05
34x4.....	28.35	5.75	7.20
35x4.....	29.25	5.85	7.50
36x4.....	30.20	6.05	7.70
33x4 1/2.....	33.75	6.65	8.55
34x4 1/2.....	35.00	7.10	9.05
35x4 1/2.....	37.00	7.25	9.30
36x4 1/2.....	38.10	7.45	9.50
37x4 1/2.....	39.15	7.70	9.80
42x4 1/2.....	44.45	8.75	10.10
35x6.....	45.50	8.65	10.90
36x6.....	46.75	8.75	11.20
37x6.....	48.00	9.05	11.50

Specify whether Regular, Clincher or Quick Detachable (Q. D.) clincher, is wanted.

MOTORISTS**STOP: Polishing Brass.**

RieNie **HARD RUBBER AIR DRYING BLACK ENAMEL** for lamps, brass fixtures, etc., can be applied by anyone. Gives you a rich black finish that is lasting; dries in ten hours to a bone hardness. Will not flake or peel off. Adequate in heat tests.

Prices, \$1.25, \$2.50, \$4.00.

RieNie **GERMAN RADIATOR COMPOUND**

will repair any ordinary leak in the radiator or waterjacket. Why pay high prices for soldering? We guarantee ours.

Prices, 75c., \$1.50.

RieNie **MOHAIR TOP WATER-PROOFING**

will clean the inside of your top very readily. Remove all oil and grease spots. Bring the nap back to its original gloss.

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RieNie **CYLINDER ENAMEL**

Gloss Black, Auto Gray or Dead Black. Will cover smoothly and stand the heat. Hot oil will not cause it to flake or chip. Will make an old motor look like new.

Prices, \$1.00, \$1.75, \$4.00

**DEALERS**

You realize the value of this line. Write to-day, get our catalogue A. We have a live proposition for you.

DO NOT LET WATER PENETRATE YOUR TOP

RieNie

MOHAIR WATERPROOFING

will refinish and waterproof your Mohair Tops. Dries in six hours, leaving a beautiful silk Mohair effect.

Prices.....\$1.25
 2.50
 4.50

RieNie

ENAMEL DRESSING

for Leather, Rubber or Pantasote Tops and Seat Cushions. Will penetrate and soften the material. Dries in six hours in a beautiful black finish. Seat Cushions or Tops will look like new after one application. Anyone can apply this dressing and get the desired results.

Prices.....Pints, \$0.60
 Qts., 1.10
 1-Gal., 2.10
 3-Gal., 4.00

WRITE US

RieNie Manufacturing Co.
 Minneapolis, Minn. U. S. A.

RieNie Products We Guarantee

WRITE US

Revolving Cases.—We have received from the American Bolt & Screw Case Company, of Dayton, Ohio, their new catalogue illustrating in colors and describing the various styles of revolving cases and cabinets which they manufacture. These cases should be invaluable to every repair man or garage owner. One of these catalogues will be sent to anyone interested who writes for it and mentions this paper.

We understand that the Randall-Faichney Co., of Boston, Mass., manufacturers of the Jericho Horn and the Jubilee Horn, are about to erect at Jamaica Plain, a large and thoroughly equipped modern factory in which to manufacture their products. This step, on their part, would seem to indicate that the owners of automobiles appreciate the horns which this company are turning out, and which we understand

are especially distinguished for efficiency, simplicity and economy.

Steam Vulcanizers.—The Wheeling Stove and Range Company of Wheeling, W. Va., have an announcement in this issue of their No. 2 and No. 402 Steam Vulcanizers which they say will repair four inner tubes in 15 minutes. They are fully guaranteed. Write to them for particulars and prices and mention the Automobile Dealer and Repairer.

The Vanguard Manufacturing Co., of Joliet, Ill., manufacturers of the popular line of "Vanguard Wind Shields" have filed an application for an additional \$25,000 of capital stock, consisting of 250 shares, par value of each being \$100. This increase of stock is desired to enable the company to erect a new factory building suitable for handling their rapidly increasing wind shield business.

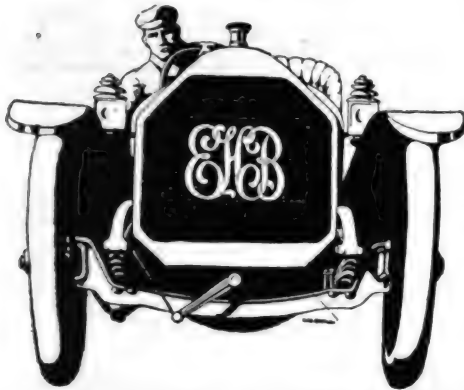
TOOL MAKING.

By EDWARD R. MARKHAM, American Society of Mechanical Engineers, Instructor in Machine Shop Work, Harvard University and Rindge Manual Training School, formerly Superintendent Waltham Watch Tool Co., 225 pp., 325 illus. Cloth binding. The whole subject is here exhaustively treated and profusely illustrated. The information given is of inestimable value to all machine shop men, metal and wood workers, and all whose tasks may occasionally call for the exercise of mechanical skill, ingenuity, and inventiveness in the devising of special means to accomplish special ends. Price.....\$1.50

Sent to any address, postage prepaid, on receipt of price.

M. T. RICHARDSON CO., Publishers,
 71-73 MURRAY STREET, NEW YORK.

Monograms



q Your's is not a public car.
q Get out of the crowd.
q Put your monogram on your car. It is the finishing touch of refinement and it will make your car distinctive.

Monograms from \$2 up

q The best at the price of the cheapest.

Send for Catalogue E

THE HICKOK MFG. CO.

44 St. Paul Street
Rochester, N. Y.



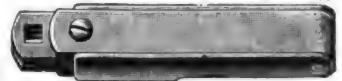
A Cinch To Sell

—this screw driver. Just show one. Its good points stick out like fence pickets. It's compact—no loose parts—each of the three blades locks separately and rigidly in the heavily nicked handle.

MARBLE'S POCKET SCREW DRIVER
WITH PREST-O-LITE KEY

is the biggest little thing in motorists' tools. You can't lose on a dozen. Good profit. Fast movers. Sell for 50 cents. Two sizes: 4 1/4 in. and 5 1/4 in. opened. Six of each size on a display board. **Send for sample on approval. Good discount.**

Marble Arms & Mfg. Co.
5072 Delta Ave., Gladstone, Mich.



The 1912 Davis "Armor."—The Davis Robe and Armor Company, State and Madison Streets, Chicago, Ill., has an advertisement in this issue briefly describing the Davis Pneumatic Steel Tire Armor, which is described by the manufacturers as a good common sense all the year around tire protector. A complete set of Davis Armor for a single tire consists of from 43 to 51 separate sections, which are readily snapped to place on any clincher type of rim in 15 minutes' time by the aid of an ordinary screw driver; when the tire is deflated, then it must be pumped up. It is claimed that a tire thus equipped is as resilient as a naked tire and absolutely non-skid. See the advertisement of this company on another page and write for descriptive circular with full particulars and prices.

The Inst Lighter on Packard Cars.—It may interest our readers to learn that the Packard Motor Car Company installs an Inst Lighter for lighting the gas headlights on every Packard car that leaves their factory. This in itself, without any further testimonial, should be sufficient as to the merits of this device, because every one knows that the Packard Motor Car Company is not satisfied with anything but the best. Readers should look over carefully the full page announcement which appears in this issue from the Inst Lighter Company, from which it will be noted that the price of this device including coil, pipe wire and everything necessary for attaching is only \$15.00. In the new 1913 model of the Inst Lighter there is a water proof coil which goes under the hood. In ordering your car be sure to specify the Inst Lighter or send your inquiries direct to the Inst Lighter Company, 56 E. Main St., Columbus, Ohio, and mention this paper.

Automobile Gasoline Gauge.—This device has just been brought out by the Specialty Sales Company, P. O. Box 177, Racine, Wis. There is to be no more trouble, the manufacturers say, in unscrewing the filler cap and measuring the gasoline with a stick. This gauge gives a perfect, steady reading even though the car and gasoline are in motion. Every one is fully guaranteed. It is believed on account of the low price that every owner of an automobile will want one. It can be placed in any tank in fifteen minutes with a tool for that purpose which is furnished with the gauge. Further particulars may be obtained by writing direct to the manufacturers as above, mentioning the Automobile Dealer and Repairer.

1912 DAVIS "ARMOR"

Attached in 5 MINUTES

NO HOOKS USED

No Leather to come "Unglued"—No Springs to Stretch or Break—No "Inner-Shoes" to Pinch the Tubes

MAIL This Valuable COUPON TODAY

DEALERS, get in line for DAVIS PROTECTORS. Will sell THEMSELVES to 90% of your customers.

Davis Robe & Armor Co.

State and Madison Streets
CHICAGO, ILLINOIS



Patented
June 29th, 1909.

DAVIS STEEL IS KING

The only Tire Protector in America that is sold under positive guarantee (under an iron-clad indemnity Bond furnished every purchaser) to double the mileage guarantee of any responsible tire maker in the world. If you buy tires with a 5,000 mile guarantee, Davis insures at least 10,000 miles of service. This Bond also covers a 2-year service guarantee.

Always Held so FIRMLY to the TIRE that its Support is ABSOLUTE—Tire ALWAYS Cool.

Coupon
D. R. & A. CO.

Send at once your liberal "first users" proposition. I have not seen the IMPROVED DAVIS ARMOR here.

Name.....
Address.....
Size of my tires.....
My dealer's name is.....

A. D. & R., May, 1912.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

GET WISE

READ THIS Unsolicited Letter we found in this paper.

From L. E. Norfleet, M.D., North Carolina.—I have run a Model T Ford since May, 1909, and it runs as good as new today. Its average cost per month has been about \$12.50, one-half what a horse and buggy cost me to keep. My machine is just as the Ford Company sent it to me, never even having had batteries placed on it, and what replacements I have needed have always been charged to me at very reasonable figures. I find the Monarch the best plug for my use, and it is the very easiest plug I know of to clean.

MONEY BACK INSTANTLY IF NOT SATISFIED.



MONARCH Porcelain Type

75 Cents Each
6 for \$3.00
Guaranteed for Six Months.



MONARCH TIMERS

For Buick and Maxwell Cars.

1 Cylinder	\$2.75
2 Cylinder	3.00
3 Cylinder	3.50
4 Cylinder	4.00
6 Cylinder	5.00

Guaranteed One Year.



Monarch Magneto Plug

Guaranteed One
Year.
\$1.00

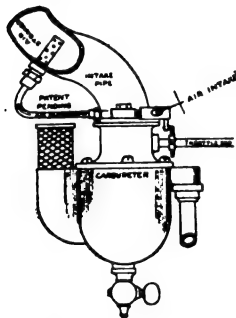


DEALERS, WRITE FOR GREAT 1912 PROPOSITION.

BENFORD MFG. CO.,
150 Pearl Street, Mt. Vernon, N. Y.



Peck's Air Inspirator



is a gasoline saver, power and speed increaser. And why?

Because it admits air into the intake pipe above the carburetor. Works automatically with the throttle. It will pay for itself in a very short while in the saving of gasoline, besides giving a cooler and smoother running motor.

It will run the car slower on closed throttle and faster on open throttle, for the reason that a carburetor adjusted to run good on closed throttle will not run perfect on open throttle.

All that has to be done with the Inspirator is to adjust the carburetor to run perfect on closed throttle, for the reason that when the throttle lever is opened it admits the air through the Inspirator, which gives a perfect mixture and increases the speed of the car with less gasoline.

This device has been tried out on several makes of cars and they are doing four and five miles more on a gallon of gasoline and can do ten and fifteen miles more per hour on speed.

One great advantage we claim for this device over others that are similar, is that the driver of a car does not have to give any of his attention to the mixture of air, as it works automatically with the throttle lever.

A car can be throttled down to four miles per hour in the city and run to its full capacity in the country, without any extra levers to shift.

We guarantee this device to give twenty to thirty per cent more power and speed, or money refunded after thirty days trial.

Descriptive circular giving full particulars and price sent on application.

Sold by **E. C. PECK**
432 Third St., SAN BERNARDINO, CAL.

Bargains in High Class Magnetos.—

J. S. Bretz Co., sole importers of the celebrated U. & H. magneto, announces in this issue their third annual magneto bargain sale. These sales which have become famous in the trade, are of great importance to every car owner who may be in need of a good magneto. The U. & H. Master Magnetos are made in Germany and they are used on many foreign cars of the best makes. The sales includes magnetos of all horsepower sizes and types, for one, two, four and six cylinder motors, suitable for use on motor cars, motor wagons, motor boats, motor cycles, stationary engines, etc. To give an illustration of the great saving afforded by patronizing this sale, we will call attention to the fact that the regular list price of \$105 for the six cylinder U. & H. magneto is cut down to \$30, or much less than one third of the regular price. Every car owner who reads this publication, and is at all interested in ignition, should write at once for circular and price list of J. S. Bretz Co., 250 West 54th St., New York City, and prompt action is necessary if you are interested, as the number of magnetos to be disposed of is limited.

Fireproof Home Garage.—We have received from the Metal Shelter Co., of St. Paul, Minn., a catalogue illustrating and describing their Fireproof Home Garage and other metal buildings. It is a book of 40 odd pages, and any reader who may be thinking of building a garage, should send for it. It will be forwarded promptly to anyone who says he saw this notice in the Automobile Dealer and Repairer.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

Golden Star Auto Body Polish Keeps Your Car Well Groomed

It cleans, polishes, preserves and protects the finish as nothing else can do.

Easy and convenient to use.

A few drops of Golden Star Polish used on the dust cloth and your car looks bright, clean and new.



Free Sample

Let us prove (without cost to you) the merits of Golden Star, "The World's Best Cleaner and Polisher." Ask your dealer for a free sample or write us and it will be sent you at once.

DEALERS—Your customers will appreciate good service. Sell them Golden Star Polish. Ask your jobber—he can supply you.

R. W. MORRIS MFG. CO.
Incorporated
Kansas City Missouri

Sell this Easy-Riding Tire

That's Trouble-proof

The Motz Cushion Tire is the only easy-riding tire unaffected by punctures or blowouts. That's why 8 times as many sets are in use as a year ago; why 3 times as many dealers are selling them. Nobody who tries Motz Cushion Tires ever goes back to treacherous, expensive pneumatic tires.



Motz Cushion Tires

have double, notched treads, which prevent skidding and distribute the weight to the sides. The undercut sides allow free action of the bridges. The slantwise, elastic bridges give and yield like the air in pneumatic tires.

Each set is guaranteed for 10,000 miles—two years. And four, not five, make a set. No extra tires or repair equipment to carry.

Twenty-two out of a possible twenty-five Electric Pleasure Car builders, as well as nine builders of high grade Commercial Cars, are using Motz Tires.

These tires are easy to apply, because they fit any standard clipper, universal quick detachable or demountable rim.

Write for Booklet 95.
We have a splendid Agency Proposition for live dealers, garage and repair men.

THE MOTZ TIRE & RUBBER CO.

Factories and Executive Offices: AKRON, OHIO.
BRANCHES:
1737 Broadway, New York 2023 Michigan Ave., Chicago
409 E. 15th St., Kansas City
999 Woodward Ave., Detroit 2352 Euclid Ave., Cleveland

STANDARD TIRE & RUBBER CO., 104-106 Portland St., Boston, Mass.,
Distributors for the New England States.

We also manufacture Demountable Solid and Cushion Tires for Commercial Cars.

"AIR GAS STARTER"

The only starter that thoroughly and with precision measures and mixes in proper proportion **air** and **gas** before it is injected into the cylinders, **when you are ready to start.**

The "Air Gas Starter" has direct communication with each individual cylinder. There is no guess-work.

The "Air Gas Starter" will positively start your motor.

There are no working parts to become deranged or lose adjustment.

The "Air Gas Starter" can be installed in a couple of hours on any car.

The "Air Gas Patent Spark Plugs" permit installation on engines not provided with pet-cocks.

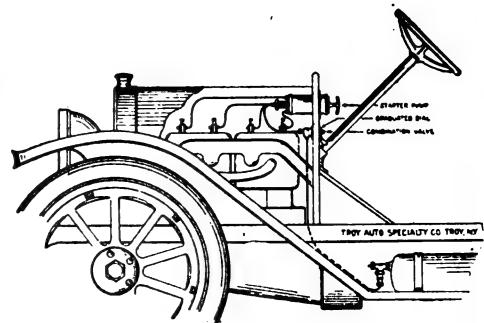
**GUARANTEED to start your motor
or money refunded**

PRICES { 4 Cylinder, \$35.00
6 Cylinder, 40.00

Send \$10.00 and specifications of your motor. We will ship one by first express, balance collect. You take no risk. Guaranteed to please. Order to-day.

TROY AUTO SPECIALTY CO.,

Troy, N. Y.



Classified Advertisements

Under this head will be printed advertisements of **Second Hand Cars Wanted** or for **Sale, Accessories of any kind Wanted** or for **Sale, Shops for Sale or Rent, Situations or Help Wanted, Second Hand Tools or Machines For Sale or to Exchange**, at the uniform price of three cents a word, including the name and address, for each insertion, payable in advance. No advertisement will be inserted for less than 50 cents, however small. Remittances may be made in postage stamps or in any convenient way.

Classified Advertisements

Address **MOTOR VEHICLE PUBLISHING CO., 71-73 Murray Street, New York.**

AUTOMOBILE INSTRUCTION—The West Side Y. M. C. A. Automobile School gives a practical course in shop and road practice in four or eight weeks, day or evening. Provision made for out of town men. 322 West 57th St., N. Y. City.

SEND US YOUR BROKEN CYLINDERS, and crank-cases to be welded at less than one-quarter the cost of new ones. Work absolutely guaranteed. Pay only after testing. Write for references and prices. Waterbury Welding Co., Waterbury, Conn.

PATENTS SECURED—C. L. Parker, Patent attorney, 962 G Street, Washington, D. C. Inventor's handbook upon request.

STEAM CAR CORRESPONDENCE SCHOOL. Finely written and illustrated course. Only school in world. Circular sent. 520 Fourteenth St., Denver, Col.

FOR SALE—"Steam Car Owners." Myers Kerosene Burner—Something new. Send for circular. 729 West Colfax, Denver, Colorado.

TIRES—Another big sale on: 10,000 Goodrichs, Michelins, Diamonds, etc., at unheard of reductions. Every size for every rim. Guaranteed. Shipped on approval. Also 5,000 Motor Cycle tires. Sacrificed. The Automobile and Cycle Company, 1769 to 1787 Broadway, New York City.

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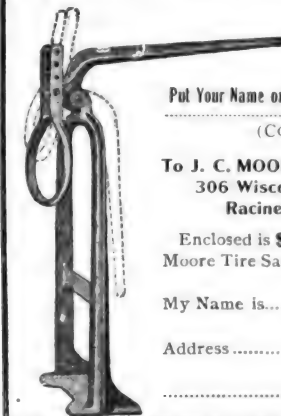
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Index to Advertisers.

Index to Advertisers.

Adamson Mfg. Co., vulcanizers...3d cover	Grossman, E. Co., spark plugs.....102	Seneca Falls Mfg. Co., lathes 28
Advance Motor Specialties Co., light- ing system .....104	Guide Motor Lamp Mfg. Co., lamps.....116	Shaler, C. A. Co., vulcanizers.....106
Ahlberg Bearing Co., ball bearings..... 8	Gun Metal Finish Co., polish..... 26	Shannon, T. R., polish.....110
Alden Sampson Mfg. Co. (Sampson) automobiles	G. J. G. Motor Car Co., automobiles... 26	Spengler Optical Co., timers.....113
Alden Sampson Mfg. Co. (Sampson) (35) automobiles	Hagstrom Bros. Mfg. Co., spark plugs.105	Splitdorf, C. F., magnetos..... 30
Allen Auto Specialty Co., tire gauges... 77	Harris, A. W., Oil Co., oil.....107	Standard Tire Protector Co., treads... 11
American Battery Co., storage batteries. 92	Hart & Widder Co., pumps.....108	Standard Woven Fabric Co., brake band lining
American Bolt & Screw Case Co., re- volving cases 8	Haws, Geo. A., oil..... 6	Stanley, John T., soap..... 79
American Electric Co., signals.....108	Hawthorne Mfg. Co., pumps.....108	Standard Brass & Iron Works, bumpers 104
American Tap & Die Co., screw plates. 20	Haywood Tire & Equipment Co., vul- canizers	Star Speedometer Co., speedometers
American Tire & Rubber Co., cement.. 12	Heath Foundry & Mfg. Co., grinders... 16	2d cover
Armiger Chemical Co., polish..... 28	Hess-Bright Mfg. Co., ball bearings... 13	Steam Carriage Boiler Co., boilers.....102
Arsenal Varnish Co., varnish 18	Hickok Mfg. Co., monograms..... 85	Stoddard-Dayton, automobiles
Atlas Auto Supply Co., repair outfits.112	Hinckley Machine Works, milling at- tachments	Superior Motor Specialty Co., spark plugs
Atlas Chain Co., tire chains.....104	Hodge & Graves Co., automobile seats.117	35 Per Cent. Automobile Supply Co., supplies
Atwater Kent Mfg. Works, ignition... 73	Holzman Auto Supply Co., supplies...102	Times Square Automobile Co., automo- biles
Auburn Auto Pump Co., pumps.....116	Horsey Mfg. Co., patches 10	Tingley, C. O. & Co., patches..... 20
Automobile & Accessories Mfg. Co., turntables	Hub Machine Welding & Contracting Co., welding	Tobey, Wm. L., rim removers..... 28
Automobile Advertising Co., advertise- ing service	Hudson Motor Car Co., automobiles...104	Toledo Auto Devices Co., putty.....109
Automobile Supply Mfg. Co., signals.....108	Inner Shoe Tire Co., tire lining..... 7	Triple-Tread Mfg. Co., treads..... 23
Automobile Tire Co., tires 24	Inst. Lighter Co., ignition.....101	Troy Auto Specialty Co., pumps..... 87
Autoparts Mfg. Co. (Jersey City, N. J.) spark plugs	Jeffery-Dewitt Co., spark plugs..... 29	Tuthill Spring Co., springs.....109
Auto Directories Co., mailing lists.....115	Johns, H. P. Manville Co., asbestos fabrics and specialties	20th Century Tire Protector Co., treads 12, 22
Auto Parts Mfg. Co. (Milwaukee, Wis.) supplies	Jones, Phineas & Co., wheels.....117	Underwood, H. B., & Co., cylinders re- bored
Auto Parts Co. (Providence, R. I.), supplies	Kellom, Chas. F. & Co., oil.....116	U. S. Compass Co., tools.....113
Auto-Tire Vulcanizing Co., vulcanizers 30	Keystone Tire & Rubber Co., tires... 14	United States Motor Co., automobiles Front cover
Baldwin Chain & Mfg. Co., chains..... 22	Kimball Tire Case Co., treads.....113	United States Tire Co., tires.....104
Barnes Drill Co., lathes.....107	K. W. Ignition Co., magnetos and spark coils	Universal Tire Protector Co., treads.106
Barnes, W. F., & John Co., lathes.....108	K. W. Mfg. Co., tire lining.....4th cover	Vacuum Oil Co., oil..... 69
Battershall, F. W. & Co., gaskets..... 29	Kroh, C. Z., Mfg. Co., tops.....104	Valentine & Co., varnishes..... 5
Benford Mfg. Co., timers and spark plugs	Lansing Co., turntables.....104	Vanderpool, W., tires..... 94
Best Ignition Equipment Co., spark plugs	Leader Mfg. Co., vulcanizers..... 26	Vanguard Mfg. Co., wind shields.....102
Blackburn Specialty Co., locks.....102	Leather Tire Goods Co., treads..... 1	Voorhees Rubber Mfg. Co., tire lining 18
Blackledge, John W., Mfg. Co., springs 115	Livingston Radiator & Mfg. Co., radi- ators	Waban Webbing Co., tire lining..... 95
Blickensderfer, G. C., spark plugs..... 22	Lobe Pump & Machinery Co., pumps.104	Waterbury Welding Co., welding..... 25
Borbeln Auto Co., bodies.....117	McIntyre, W. H. Co., automobiles...102	Watres Mfg. Co., signals.....105
Breakstone, S., locks..... 75	McLain, H. E., & Co., tire chains..... 30	Western Automobile Supply Co., inner casing
Brennan Motor Mfg. Co., motors..... 31	MacKae Mfg. Co., terminals.....113	Western Motor Co., motors.....108
Bretz, J. S., Co., magnetos.....104	Mahoney, Dr. W. F., paint..... 31	Western Robe Mills, buggy washers... 14
Briceton Mfg. Co., treads..... 71	Marble Arms & Mfg. Co., screw drivers 85	Western Welding & Mfg. Co., welding 28
Bridgeport, Bras Co., pumps..... 2	Martin, L. G., cement.....116	Wheeling Stove & Range Co., vulcaniz- ers
Brilliant Gas Lamp Co., gasoline light- ing system	Marvel Carburetor Co., carburetors...102	29
Brown Co., pumps.....108	Maxwell-Briscoe Motor Co., automo- biles	Whittaker Chain Tread Co., tire chains 110
Brush Runabout Co., automobiles..... 31	Mayo Mfg. Co., pumps..... 93	Wiley & Russell Mfg. Co., screw plates, tools
Buffalo Forge Co., tools.....120	M. & M. Mfg. Co., repair outfits..... 10	Williams Foundry & Machine Co., re- pair outfits
Butterfield & Co., screw plates.....120	Mendenhall, C. S., road maps.....102	Williams, J. H., & Co., drop forgings... 2
Buob & Scheu, auto tops.....104	Merriam, G. & C. Co., Webster's new international dictionary	Williams, Mfg. Co., repair outfits..... 31
Canton Foundry & Machine Co., turn- tables and jacks	Metal Body Tank & Fender Co., sup- plies	Winchester Machine Works tools.....117
Cartercar Co., automobiles..... 9	Metallic Automobile Matting Co., mat- ting	Woven Steel Hose & Rubber Co., brake band lining
Catelain, A. G., hose clamps.....109	Michener, E. S., carbon remover.....109	Zacharias, E. H., motors.....111
Champion Blower & Forge Co., tools... 25	Miller, Chas. E., vulcanizers.....119	
Champion Spark Plug Co., spark plugs 102	Milwaukee Bronze Casting Co., lamps.102	
Clarke Carter Automobile Co., automo- biles	Model Gas Engine Works, Motors..... 12	
Colorado Tire & Leather Co., treads... 92	Modern Automatic Appliance Co., steer- ing device	
Columbia Motor Car Co., automobiles... 104	Moller Bros. Controller & Economizer Co., fuel economizer	
Comstock, Geo. S., compressors.....104	Montgomery Machine Co., vulcanizers.110	
Conover & Robinson, wind shields.....104	Moore, J. C., & Co., packs..... 89	
Courier, automobiles.....111	Morris, R. W. Mfg. Co., polish..... 87	
Cray Bros., supplies.....111	Mosler, A. R. & Co., spark plugs..... 67	
Crone, F. G., pumps.....102	Motor Accessories Makers, Inc., cem- ent	
Curtis & Co., Mfg. Co., pumps..... 20	Motz Tire & Rubber Co., tires..... 87	
Davies, J. P., Co., soap..... 6	National Motor Supply Co., vulcanizers 65	
Davis Robe & Armor Co., treads..... 85	National Sales Corporation, brake band lining	
Dayton Inner Tire & Mfg. Co., tire lin- ing	National Welding & Mfg. Co., welding.102	
Dayton Motor Car Co., automobiles...102	New York Coil Co., ignition.....119	
Delta Mfg. Co., spark plugs.....102	New York & New Jersey Lubricant Co., oil	
Diamond Rubber Co., tires, tire stock.118	Northwestern Chemical Co., cement... 14	
Double-Fabric Tire Co., tire lining... 21	Olmsted's, L. H., power hack saws...108	
Dover Stamping & Mfg. Co., funnels... 24	O'Neill Tire & Rubber Co., vulcanizers.102	
Draver Mfg. Co., cable supports.....113	Packard Electric Co., ignition cables... 26	
Duryea, Chas. D., & Co., automobiles.102	Page Lester Co., repair outfits.....115	
Edelmann, E., & Co., tire gauges.....120	Peck, E. C., air inspirators..... 86	
Edgar Mfg. Co., signals.....102	Peerless Accessories Mfrs., pumps...109	
Empire Tire Co., tires..... 18	Peerless Cement Co., repair outfits...102	
Endura Mfg. Co., fibre..... 27	Perfect Mfg. Co., vehicle washers... 92	
Essex Rubber Co., tire lining..... 95	Phillips-Lafitte Co., brazing com- pounds	
Esterlin Co., ignition..... 22	Pitner Pump Co., pumps..... 28	
Excelsior Tire Co., tires..... 4	Planhard Mfg. Co., carburetors..... 26	
E-Z-2-Work Steam Vulcanizer Co., vul- canizers	Porter, H. K., bolt clippers.....104	
Felton Sibley & Co., varnishes..... 25	Prest-O-Lite Co., tanks, tubes..... 98	
Firestone Tire & Rubber Co., tire stock 96	Quality Cement Co., cement.....110	
Fisher & Norris, vises..... 31	Queen Mfg. Co., treads..... 17	
Fox Typewriter Co., typewriting ma- chines	Racine Auto Tire Co., tires.....102	
Garage Equipment Mfg. Co., supplies... 30	Randall-Falchney Co., signals.....115	
Gardner Governor Co., air compressors 29	Remy Electric Co., magnetos..... 19	
Gardner Engine Starter Co., trusses... 27	Richardson Tire Co., repair outfits...103	
Garvin Machine Co., tools..... 24	Rie Nie Mfg. Co., radiator compound... 84	
Geisler Bros., storage batteries.....104	Robinson, Wm. C., & Sons Co., oil...107	
Gem City Liquid Vulcanizer Co., re- pair outfits	Royal Equipment Co., brake band lining 99	
Gibney, Jas. L. & Bro., vulcanizers...102	Sager, J. H., Co., shock absorber.....110	
Glimer, Jr., G. Walker, pliers..... 32	Sampson, automobiles.....118	
Goodrich, B. F., Co., tires..... 15	Sanche, Dr. H., & Co.....118	
Grant, H. M., fibre.....102	Scaife, Wm. B., & Sons Co., gasoline outfits	
Gray Specialty Co., reliners.....94, 95	Schrader's A. Son, tire gauges..... 32	
Great American Rubber Co., tires..... 83	Schug Electric Mfg. Co., storage bat- teries	
	Sebastian Lathe Co., lathes..... 20	
	Security Co., patches.....104	
	Selbach Rubber Co., patches..... 92	

Classified Buyers' Guide.

Advertising Service Automobile Advertising Co.100	Air Compressors Gardner Governor Co.29 Williams Foundry & Machine Co.... 16	Air Inspirators Peck, E. C. 86	Aluminum Cases Repaired Hub Machine Welding & Contracting Co. 18	Aluminum Welding Composition Hub Machine Welding & Contract- ing Co. 18	Asbestos Fabrics and Specialties Johns, H. W., Manville Co..... 29	Automobiles Alden Sampson Mfg. Co. (Sampson 35) Alden Sampson Mfg. Co. (Sampson). Brush Runabout Co. 9 Cartercar Co. 9 Clarke Carter Automobile Co. 92 Columbia Motor Car Co. Courier Dayton Motor Car Co. Duryea, C. D., Co.102 G. J. G. Motor Car Co. 26 Hudson Motor Car Co.104 Maxwell-Briscoe Motor Co. McIntyre, W. H., Co.102 Times Square Automobile Co. 20 United States Motor Co.Front cover	Automobile Seats Hodge & Graves Co.117	Ball Bearings Ahlberg Bearing Co. 8 Hess-Bright Mfg. Co. 13	Bodies Borbeln Auto Co.117	Boilers Steam Carriage Boiler Co.102 Williams Foundry & Machine Co.... 16	Bolt Clippers Porter, H. K.104
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Classified Buyers' Guide.

Advertising Service	Automobile Advertising Co.100
Air Compressors	Gardner Governor Co. ....29
	Williams Foundry & Machine Co.... 16
Air Inspirators	Peck, E. C. 86
Aluminum Cases Repaired	Hub Machine Welding & Contracting Co. 18
Aluminum Welding Composition	Hub Machine Welding & Contract- ing Co. 18
Asbestos Fabrics and Specialties	Johns, H. W., Manville Co..... 29
Automobiles	Alden Sampson Mfg. Co. (Sampson 35)
	Alden Sampson Mfg. Co. (Sampson).
	Brush Runabout Co. 9
	Cartercar Co. 9
	Clarke Carter Automobile Co. 92
	Columbia Motor Car Co.....
	Courier
	Dayton Motor Car Co.....
	Duryea, C. D., Co.....102
	G. J. G. Motor Car Co..... 26
	Hudson Motor Car Co.....104
	Maxwell-Briscoe Motor Co.
	McIntyre, W. H., Co.....102
	Times Square Automobile Co..... 20
	United States Motor Co.... Front cover
Automobile Seats	Hodge & Graves Co.....117
Ball Bearings	Ahlberg Bearing Co. 8
	Hess-Bright Mfg. Co. 13
Bodies	Borbeln Auto Co. ....117
Boilers	Steam Carriage Boiler Co. ....102
	Williams Foundry & Machine Co.... 16
Bolt Clippers	Porter, H. K. ....104

Brake Band Lining Johns, H. W. Manville Co. 29 National Sales Corporation 104 Royal Equipment Co. 99 Standard Woven Fabric Co. 24 Woven Steel Hose & Rubber Co. 104	Lock Washers K.W. Ignition Co. 114 Remy Electric Co. 19	Shock Absorbers Sager, J. H., Co. 110
Bracing Compounds Phillips-Lafitte Co. 105	Magnets Bretz, J. S., Co. 104 K.W. Ignition Co. 114 Splittorf, C. F. 30	Signals American Electric Co. 108 Automobile Supply Mfg. Co. 108 Edgar Mfg. Co. 102 Randall-Faichney Co. 115 Troy Auto Specialty Co. 87 Watres Mfg. Co. 105
Brasing Powders Phillips-Lafitte Co. 105	Mailing Lists Auto Directories Co. 115	Soaps Davies, J. P. Co. 6 Stanley, John T. 79
Buggy Washers Western Robe Mills 14	Maps Mendenhall, C. S. 102	Spark Plug Terminals Mac Kae Mfg. Co. 113
Bumpers Standard Brass & Iron Works. 104 Troy Auto Specialty Co. 87	Matting Metallic Automobile Matting Co. 102	Spark Plug Protectors Mac Kae Mfg. Co. 113
Cable Supports Draver Mfg. Co. 113	Milling Attachments Hincley Machine Works 26	Spark Plugs Autoparts Mfg. Co. (Jersey City, N. J.) 28 Best Ignition Equipment Co. 32 Blickensderfer, G. C. Co. 22 Champion Spark Plug Co. 102 Delta Mfg. Co. 102 Grossman, E., Co. 102 Hagstrom Bros. Mfg. Co. 105 Jeffrey-Dewitt Co. 29 Mac Kae Mfg. Co. 113 Mosler, A. R. & Co. 67 Superior Motor Specialty Co. 102
Carbon Removers Michener, E. S. 109 Northwestern Chemical Co. 14 Prest-O-Lite Co. 98	Monograms Hickok Mfg. Co. 85	Speedometers Star Speedometer Co. 2d cover
Carburetors Marvel Carburetor Co. 102 Planhard Mfg. Co. 26	Motors Brennan Motor Mfg. Co. 31 Model Gas Engine Works 12 Western Motor Co. 108 Zacharias, E. H. 111	Springs Blackledge, John W., Mfg. Co. 115 Tuthill Spring Co. 109
Cement American Tire & Rubber Co. 12 Martin, L. G. 116 Motor Accessories Makers, Inc. 102 Northwestern Chemical Co. 14 Quality Cement Co. 110	Non-Conducting Coverings Johns, H. W. Manville Co. 29	Steam Packings Johns, H. W. Manville Co. 29
Chains Baldwin Chain & Mfg. Co. 22	Oil Gauges Troy Auto Specialty Co. 87	Steering Devices Modern Automatic Appliance Co. 102
Clutches Williams Foundry & Machine Co. 16	Oils Harris, A. W., Oil Co. 107 Haws, Geo. A. 6 Kellom, Chas. F. & Co. 116 New York & New Jersey Lubricant Co. 97 Robinson, Wm. C. & Son Co. 107 Vacuum Oil Co. 69	Storage Batteries American Battery Co. 92 Geisler Bros. Storage Battery Co. 104 Schug Electric Mfg. Co. 109
Compressor Comstock, Geo. S. 104	Paint Mahoney, Dr. W. F. 31	Supplies Auto Parts Mfg. Co. (Milwaukee, Wis.) 10 Auto Parts Co. (Providence, R. I.) 81 Cray Bros. 111 Garage Equipment Mfg. Co. 30 Holzman Auto Supply Co. 102 Metal Body Tank & Fender Co. 111 35 Per Cent. Automobile Supply Co. 93
Cylinders Bored Garvin Machine Co. 24 Underwood, H. B., & Co. 4	Patches Gray Specialty Co. 94, 95 Horsey Mfg. Co. 10 Security Co. 104 Selbach Rubber Co. 92 Tingley, C. O., & Co. 30	Tanks Prest-O-Lite Co. 98
Detachable Treads Leather Tire Goods Co. 1	Pliers Gilmer, Jr., G. Walker. 32	Terminals Mac Kae Mfg. Co. 113
Dictionary (Webster's New International) Merriam, G. & C., Co. 108	Polish Armiger Chemical Co. 28 Gun Metal Finish Co. 26 Morris, R. W. Mfg. Co. 87 Shannon, T. R. 110	Timers Benford Mfg. Co. 86 Mac Kae Mfg. Co. 113 Spengler Optical Co. 113
Directories Auto Directories Co. 115	Power Hack Saws Olmsted's, L. H., Son 108	Tire Chains Atlas Chain Co. 104 McLain, H. E. & Co. 30 Whittaker Chain Tread Co. 110
Drop Forgings Williams, J. H., & Co. 2	Pumps Auburn Auto Pump Co. 116 Bridgeport Brass Co. 2 Brown Co. 29 Crone, F. G. 102 Curtis & Co., Mfg. Co. 20 Hart & Widder Co. 108 Hawthorne Mfg. Co. 108 Lobee Pump & Machinery Co. 104 Mayo Mfg. Co. 93 Peerless Accessories Mfrs. 109 Pitner Pump Co. 28 Prest-O-Lite Co. 98 Troy Auto Specialty Co. 87	Tire Gauges Allen Auto Specialty Co. 77 Edelmann E. & Co. 120 Schrader's, A., Son 32
Electrical Supplies Johns, H. W., Manville Co. 29 Grant, H. M. 102	Putty Toledo Auto Devices Co. 109	Tires Automobile Tire Co. 24 Diamond Rubber Co. 118 Empire Tire Co. 18 Excelsior Tire Co. 4 Goodrich, B. F., Co. 15 Great American Rubber Co. 83 Keystone Tire & Rubber Co. 1b Motz Tire & Rubber Co. 87 Racine Auto Tire Co. 102 United States Tire Co. 104 Vanderpool, W. 94
Fibre Endura Mfg. Co. 27	Radiators Livingston Radiator & Mfg. Co. 88 Rie Nie Mfg. Co. 84	Tire Lining Dayton Inner Tire & Mfg. Co. 16 Double-Fabric Tire Co. 21 Essex Rubber Co. 95 Inner Shoe Tire Co. 7 K. & W. Mfg. Co. 4th cover Voorhees Rubber Mfg. Co. 18 Waban Webbing Co. 95
Fire-Proof Cements Johns, H. W. Manville Co. 29	Radiators Repaired Livingston Radiator & Mfg. Co. 88	Tire Kettles Williams Foundry & Machine Co. 16
Friction Clutches Williams Foundry & Machine Co. 16	Re-Liners Gray Specialty Co. 94, 95	Tire Molds Williams Foundry & Machine Co. 16
Fuel Economizers Moller Bros. Controller & Economizer Co. 27	Repair Outfits Atlas Auto Supply Co. 112 Gem City Liquid Vulcanizer Co. 24 Gray Specialty Co. 94, 95 M. & M. Mfg. Co. 10 Page-Lester Co. 115 Peerless Cement Co. 102 Richardson Tire Co. 103 Williams Foundry & Machine Co. 16 Williams Mfg. Co. 31	Tire Repair Equipment William Foundry & Machine Co. 16
Funnels Dover Stamping & Mfg. Co. 24	Re-Treading Rings Williams Foundry & Machine Co. 16	Tire Stock Diamond Rubber Co. 118 Firestone Tire & Rubber Co. 96
Gaskets Battershall, F. W., & Co. 29	Revolving Cases American Bolt & Screw Case Co. 8	Tools Buffalo Forge Co. 31 Champion Blower & Forge Co. 25 Garvin Machine Co. 24 U. S. Compass Co. 113 Wiley & Russell Mfg. Co. 108 Winchester Machine Works 117
Gasoline Lighting System Brilliant Gas Lamp Co. 108	Rim Removers Tobey, Wm. L. 28	
Gasoline Storage Outfits Scaife, Wm. B., & Sons Co. 102	Roofing and Building Materials Johns, H. W., Manville Co. 29	
Grinders Heath Foundry & Mfg. Co. 16	Screw Drivers Mac Kae Mfg. Co. 113 Marble Arms & Mfg. Co. 85	
Hose Clamps Catelain, A. G. 109	Screw Plates American Tap & Die Co. 20 Butterfield & Co. 120 Wiley & Russell Mfg. Co. 108	
Ignition Atwater Kent Mfg. Works. 73 Esterline Co. 22 Inst. Lighter Co. 101 New York Coil Co. 119 Packard Electric Co. 26		
Inner Casing Western Automobile Supply Co. 30		
Jacks Moore, J. C., & Co. 89		
Lamps (side and tail) Guide Motor Lamp Mfg. Co. 116 Milwaukee Bronze Casting Co. 102		
Lathes Barnes Drill Co. 107 Barnes, W. F. & John Co. 108 Sebastian Lathe Co. 20 Seneca Falls Mfg. Co. 28		
Lighting System Advance Motor Specialties Co. 104		
Locks Blackburn Specialty Co. 102 Breakstone, S. 75		

Top Dressing (auto)	
Felton, Sibley & Co.	25
Tops	
Buob & Scheu	104
Kroh, C. Z., Mfg. Co.	104
Treads	
Bricton Mfg. Co.	71
Colorado Tire & Leather Co.	3
Davis Robe & Armor Co.	85
Kinball Tire Case Co.	113
Leather Tire Goods Co.	1
Queen Mfg. Co.	17
Standard Tire Protector Co.	11
Triple-Tread Mfg. Co.	23
20th Century Tire Protector Co.	12, 22
Universal Tire Protector Co.	106
Trusses	
Gardner Engine Starter Co.	27
Tubes	
Prest-O-Lite Co.	98
Turntables	
Automobiles and Accessories Mfg. Co.	113
Canton Foundry & Machine Co.	8
Turntables for Garage	
Lansing Co.	104
Typewriting Machines	
Fox Typewriter Co.	117
Varnishes	
Arsenal Varnish Co.	18
Felton, Sibley & Co.	25
Valentine & Co.	5
Vehicle Washers	
Perfect Mfg. Co.	92
Vices	
Fisher & Norris	31
Vulcanizers	
Johns, H. W. Manville Co.	29
Vulcanizers	
Adamson Mfg. Co.	3d cover
Auto Tire Vulcanizing Co.	30
E-Z-2-Work Steam Vulcanizer Co.	111
Gibney, Jas. L. & Bro.	102
Haywood Tire & Equipment Co.	115
Leader Mfg. Co.	26
Miller, Chas. E.	119
Montgomery Machine Co.	110
National Motor Supply Co.	65
O'Neill Tire & Rubber Co.	102
Shaler, C. A. Co.	106
Wheeling Stove & Range Co.	29
Williams Foundry & Machine Co.	16
Welding	
Hub Machine Welding & Contracting Co.	18
National Welding & Mfg. Co.	102
Waterbury Welding Co.	25
Western Welding & Mfg. Co.	28
Welding by Electricity	
Hub Machine Welding & Contracting Co.	18
Welding Plates	
Phillips-Laffitte Co.	105
Welding Powders	
Phillips-Laffitte Co.	105
Wheels	
Jones, Phineas & Co.	117
Wind Shields	
Conover & Robinson	104
Grossman, E. Co.	102
Vanguard Mfg. Co.	102
Wind Shield Glass Cleaners	
Grossman, E. Co.	102
Wrenches	
Mac Kae Mfg. Co.	113

The M. & M. Economizer.

This device illustrated herewith is attached to the intake pipe and is operated by a foot pedal. Its object is to save gasoline, increase power and to add to the general efficiency of the car. The



The M & M Economizer.

manufacturers make the following very broad claims for this device, but we wish to say that they also send the article out with a very strong guarantee. It is claimed that the economizer will increase the speed of the car, will furnish more power with less gasoline, will keep the engine cool, lubricate the cy-

CUTTING CARS

"Cutting" cars cost less per horsepower and per wheel base inch than any other automobile selling for \$1200 or over.

Dealers everywhere will do well to correspond with us. Address

CLARKE-CARTER AUTOMOBILE COMPANY,
Jackson, Mich.

Let Us Show You How
SER-VIS TIRE LININGS
Reduce Your Tire Expense 40%
SELBACH RUBBER CO.,
Atlantic Avenue, Boston, Mass.



"AMERICAN"
STORAGE BATTERIES
FOR AUTOMOBILES—All Styles
RECTIFIERS—All Sizes

AMERICAN BATTERY COMPANY
1136 Fulton Street, Chicago, Ill.



"PERFECT"
VEHICLE WASHERS

save labor, water and hose.

CATALOGUE
PERFECT MFG. CO.
ALBANY, N. Y.

linders, save the brakes, prolong the life of the batteries, save the clutch and gears, and give better control over the car. The saving in gasoline is claimed to be as high as 30 per cent. The device also saves the safety valve in case of back-firing. It makes a hilly country easy to travel, and makes the crowded streets and rough roads easier. The manufacturers put the whole thing in a nut-shell when they state that "what the coaster-brake is to the bicycle, the M. & M. is to the automobile." It is made with two valves, one for speed and one for coasting and by its use no gasoline is consumed when the car is going down hill. The manufacturers will send the complete device to any of our readers for \$3.50, f.o.b. Philadelphia, and the money will be refunded if it will not do all they claim. Under these circumstances there should be no hesitation in giving the device a trial, and your orders should be sent to Moller Bros., Controller and Economizer Co., 700 Betz Bldg., Philadelphia, Pa. In writing them, please mention this magazine.

Greenfield Tap & Die Company.—A holding company, to be known as the Greenfield Tap & Die Company, with a capital of \$1,000,000 preferred stock and \$1,000,000 common stock, was organized in Boston, April 2d. The new company will control the Wiley & Russell Manufacturing Company and the Wells Brothers Company, both of Greenfield, the two largest manufacturing industries in that town. Turner, Tucker & Company of Boston secured an option recently for two-thirds of the capital stock of the Wiley & Russell Manufacturing Company, the option price being \$600,000. This is about \$1,800 a share. Charles P. Russell, who is the president and treasurer of the Wiley & Russell Manufacturing Company, established the business many years ago. He is now 72 years old and desires to retire from active business. After securing the option on the Wiley

& Russell Manufacturing Company, Turner, Tucker & Company formed a merger of the Wiley & Russell Manufacturing Company and the Wells Brothers Company. The officers elected follow: F. O. Wells of Greenfield, president; W. M. Pratt of Greenfield, vice-president; F. H. Payne of Boston, treasurer; the above and J. W. Stevens of Greenfield, A. C. Dutton of Springfield, J. H. Drury of Athol and W. J. Carlin of Boston, directors.

We understand that the Seldon Motor Car Co., of Houston, Tex., has taken the agency for the sale of the Great American Tires for south and southwest Texas, under the exclusive co-operative dealers' selling system of the Great American Rubber Co. The E. S. Sporting Goods & Auto Supply Co., of Athens, Ga., have also taken an agency for these tires. J. B. McClelland, of Sault Ste. Marie has also taken an agency. We understand that the system giving exclusive right to sell the tires for this company is pleasing dealers throughout the country.

A New Ignition Device.

There can be no doubt that the high degree of perfection and reliability possessed by the automobile of today is largely due to the efforts of ignition manufacturers. As evidence of this statement it may be recalled that in the first reliability run from New York to Pittsburgh, 72 per cent. of all troubles were caused by faulty ignition. The Rhoades' Ignition System is representative of the highest development in battery ignition. The device illustrated replaces the ordinary timer. An ingenious mechanical movement which makes and breaks the circuit through a non-vibrat-



Substitute for a Timer.

ing coil, causing a single spark of great heat to be delivered in the proper cylinder. The instrument cannot stop in contact, and a button is provided for starting on the spark. Six dry cells are claimed to furnish perfect ignition for two to three thousand miles' running. This system is fully described and with other ignition matters in general are thoroughly treated in a catalogue which will be sent to all readers of the Automobile Dealer & Repairer upon request. The device is manufactured by the New York Coil Co., 338 Pearl Street, New York City.

No-Top-Leak.—This preparation is manufactured by L. G. Martin, 3925 Forbes Street, Pittsburgh, Pa., and it is said that it will make a leaking mo-hair top absolutely water proof. Write for descriptive circular and prices.

THE "SPARK PLUG" PUMP

Is adaptable for use on all four cycle motors of two, four or six cylinders, and offers at last a simple and practical way to inflate tires using **PURE, FRESH AIR** without the laborious, hard work of doing it by hand.

Simply remove a Spark Plug from any convenient cylinder and substitute the pump (with the hands only) is the advantageous method of attaching to all motors.

The cylinder used doesn't fire, therefore any spark plug can be utilized with either dual or single ignition system. If so desired, a valve cap may be tapped out and fitted with a permanent pet-cock, making it unnecessary to remove a spark plug in using.

The pumps work equally well on all sized cars, from the smallest Ford to the largest Lozier.

After connecting the hose from pump to tire, motor should be started and run on low throttle from two to four minutes, depending on the size of tire—maximum pressure obtainable, 150 pounds.



The pump is noiseless in operation and requires no attention whatever, other than an occasional drop of oil.

This pump is designed on a compound principle, **PURE, FRESH AIR** which is liberally supplied by the intake air valve being compounded to high pressure into the small barrel and thence forced to the tire.

The construction is simple and mechanically perfect throughout with no wearing parts to give trouble or get out of order. **Just like your engine, with metal rings—built to last as long as your car.**

Our Design makes this Pump Absolutely Indestructible. The pumping piston only operates when motor is run on low throttle and automatically locks when the engine is raced; again operating when the throttle is lowered.

An article that is small, light, compact, weighing only two and one-half pounds, which can be carried anywhere—always in working order and ready to use.

Our Selling Plan enables you to try this pump on your own car before purchasing. Furnished with adapters to fit any car and complete with 12 feet of superior hose and connections. **PRICE (Pressure Register \$2.00 extra), \$10.00**

THE MAYO MANUFACTURING CO.

59 E. 18th STREET

CHICAGO, ILL.

AUTOMOBILE SUPPLIES FREE GIVEN AWAY

IN OUR PREMIUM CATALOG, WHICH IS NOW READY AND WILL BE **SENT FREE ON REQUEST.**

Have you a copy of our general Catalog No. 28 P? 128 Pages. 1000 Illustrations. Free on request.

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that the prices in our Large Catalog are an average of 35% lower than those quoted by others on the same grade of goods and that these Premiums are given in addition

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NEW YORK

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1508 Michigan Ave.,
CHICAGO, ILL.

One Catalogue—One Price—One Policy.

Your MONEY'S WORTH or Your Money Back.



New K-W Ignition Catalogue.—We have just received from the K-W Ignition Company, 2817 Chester Avenue, Cleveland, Ohio, their new catalogue comprising 64 pages in which will be found illustrated and described the different magnetos made by this company, together with a copy of the guarantee which this company gives with each sale. The catalogue also describes the various spark plugs they make as well as the electric head lights. This company also manufactures the well known "Master" vibrator. One of these catalogues will be sent to every reader interested enough to write for it and mention the Automobile Dealer and Repairer.

Tops, Wind Shields, etc.—These are made by the Metal Body Tank and Fender Company, 414 Canal Street, N. W., Cleveland, Ohio. See their advertisement on another page and write for

further particulars and prices, mentioning the Automobile Dealer and Repairer.

Watres Power Whistle.—Watres Manufacturing Co., 383 4th Ave., New York City, have an announcement on another page of their new signal for automobiles, which they say gives a powerful, compelling blast which cannot be ignored. They claim that a whistle constitutes the best form of warning. This whistle is operated by burned gas from the engine stored in a small reservoir to which the whistle is connected. A touch of the foot pedal operates the whistle and the blast echoes a mile ahead. Send for booklet giving full particulars, and mention the Automobile Dealer and Repairer.

Decision in Favor of Emil Grossman Co.—The District Court of the United States for the Southern District of New York has dismissed the Bill of Com-

plaint entered by the Rose Mfg. Co. of Philadelphia, against the Emil Grossman Co.; the complaint being that the Emil Grossman Co. has been handling other license pad holders than the patented "Never Out" holder, which is made by the Rose Mfg. Co.

Endura Packing.—This packing, which is especially recommended for crank and gear-case gaskets, has many good points. It cuts easily, makes a tight joint, and does not rot or soften by the action of liquids or deteriorate with age. You won't have to make a new gasket the next time you open your case, no, nor the next time either, if you use Endura. It is simply invaluable in the repair shop. The manufacturers would be glad to send you a free sample, if your dealer does not carry this material in stock. Write to the Endura Mfg. Co. Phila., Pa., and mention this magazine.

COLUMBIA TIRES—White Tough Tread

3000 MILES GUARANTEED

If you are in the Auto or Supply business Columbia Tires are the best Dealers' proposition. They sell easy and wear as well as the rest of them. Exclusive agency to live, hustling dealers. Write to-day before your competitor beats you to it.

Columbia Tires are made with the same care and attention as others you pay more money for.

The difference is in the price only.

	CASES	TUBES
23 x 3.....	\$10.55	\$3.00
30 x 3.....	11.50	3.20
30 x 3½.....	16.40	4.35
32 x 3½.....	17.50	4.55
34 x 3½.....	18.95	4.85
33 x 4.....	24.50	6.10
34 x 4.....	25.25	6.25
36 x 4.....	26.80	6.60

On receipt of 10 per cent. we ship, allow examination. Send post office or express money order if tires are wanted without delay. If you send personal check be sure to have your bank certify same.

VANDERPOOL TIRE AND RUBBER CO.
Springfield, Ohio

March 23, 1912.

Wm. Vanderpool, Springfield, Ohio

My Dear Sir—Inclosed you find my check for \$55.45, for which please send me at once by express the following:

- 2 Columbia Casings, 32x3½.
- 1 Columbia Casing, 31x4, clincher.
- 1 Tube, 32x3½.

The casings and tubes I ordered some time ago are entirely satisfactory and have proven fully as good as the Goodrich that preceded them.

Respectfully,

(Signed) DR. E. E. RICE,
Shawnee, Okla.

Upper Sandusky, O., Oct. 19, 1911.

Mr. Wm. Vanderpool, Springfield, Ohio.

Sir—Please send me at once one Columbia case, 38x3, by express. Find enclosed a P. O. money order for the whole amount. I ordered a tire some time ago and find that they were all right.

Your customer,

(Signed) ARTHUR C. SCHOENBERGER,
384 W. Wyandotte Ave.

If it's GRAY'S—It's the Best GRAY'S Newark XXX Reliners

Four to Six Ply—Superfine Tire Fabric—Coated with SELF-CURING CEMENT to Prevent Creeping—Perfect Fitting.

GUARANTEED NOT TO BLOW OUT!!

28x3.....	\$3.00	36x3½.....	\$4.40	36x4.....	\$5.50
30x3.....	3.20	30x4.....	4.50	32x4½.....	5.70
32x3.....	3.40	31x4.....	4.60	34x4½.....	5.90
34x3.....	3.60	32x4.....	4.80	36x4½.....	6.00
30x3½.....	3.80	33x4.....	5.00	35x5.....	7.00
32x3½.....	4.00	34x4.....	5.10	36x5.....	7.40
34x3½.....	4.20	35x4.....	5.30	37x5.....	7.80

This is a special introductory offer and goods will be sent prepaid on receipt of price.

GRAY SPECIALTY CO., - 148 Avon Avenue, Newark, N. J.
JOBBERS—We Want Live Inquiries—DEALERS.

Notable Display of Wheels.—Phineas Jones & Co., of Newark, New Jersey, and 12th Ave. and 55th St., New York City, the well known wheel makers, had a motor truck in the recent New York truck parade and to show the variety of their work, they had a wheel for a ten ton motor truck with 6 inch spokes and felloes 12 inches wide and a small wheel for a boy's automobile only 13 inches high with a ¾ inch spoke and a ⅞ inch felloe and rubber tires. The heavy wheel weighed 600 lbs., and the light wheel 6 lbs., showing a remarkable contrast. The entire exhibit attracted a great deal of favorable attention along the line of march.

Annular Ball Bearings.—The Ahlberg Bearing Company, 2632 Michigan Avenue, Chicago, Ill., have an announcement in this issue which will interest a great many of our readers. They say "Do not throw away your annular ball bearings." Send them to the above company and they will regrind them and make them as good as new." Write at once for further particulars and prices.

Gardner Patented Rear Axle Truss.—The Gardner Engine Starter Company,

1451 Michigan Avenue, Chicago, Ill., has an announcement in this issue illustrating and briefly describing the Gardner patented rear axle truss, which it is said will strengthen your Ford "T" rear axle 500 per cent. and stop chattering and vibration. Can be installed in three minutes. They have a plan of getting pistons out of Ford engines without taking the engine from the car, which they will explain to every Ford car owner who may be interested enough to write for it.

Marble's Pocket Screw Driver.—The Marble Arms & Mfg. Company, 5072 Delta Avenue, Gladstone, Mich., manufacture a pocket screw driver with a Prest-O-Lite key which they say is the biggest little thing that a motorist can have in his kit of tools. They sell for 50 cents and are in two sizes as the advertisement shows. This company invites dealers and repair men to send for samples on approval and special discounts.

Auto Lock Switch.—The Blackburn Specialty Company, 1124 Prospect Avenue, S. E. Cleveland, Ohio, make an auto lock switch which they say will positively prevent any car from being

stolen or used without the consent of the owner. This lock switch gives no bother we understand. Physicians running their own cars should be especially interested in a device of this kind.

Automobile Tops.—These are made by the C. Z. Kroh Mfg. Company, Toledo, Ohio. Send for their illustrated catalogue and price list.

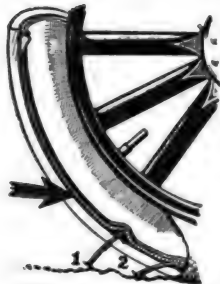
A. J. Rogers, who has been connected with the sales department of the Remy Electric Company, Anderson, Ind., makers of the famous Remy magnetos, has been transferred to the San Francisco branch 170 Golden Gate Ave., in the capacity of branch manager. Mr. Rogers will take charge of the Pacific Coast territory and the San Francisco branch on April 15.

L B A Battery Business Growing.—The Willard Storage Battery Co., of Cleveland, Ohio, have moved their executive offices to 5716 Euclid Ave., this change being made necessary on account of their rapidly growing business demanding all available factory space. In addition they are breaking ground for a factory extension which adds approximately 25,000 feet to their present facilities.

YOUR TIRES WILL NOT Puncture or Blowout

WHEN LINED WITH "BULLET PROOF" INNER TUBE PROTECTING WEBBING

Every owner finds tire trouble not only the most expensive item in the cost of upkeep but the greatest drawback to the pleasure of motoring as well.



1. Shows webbing taking nail.
2. Turning nail.

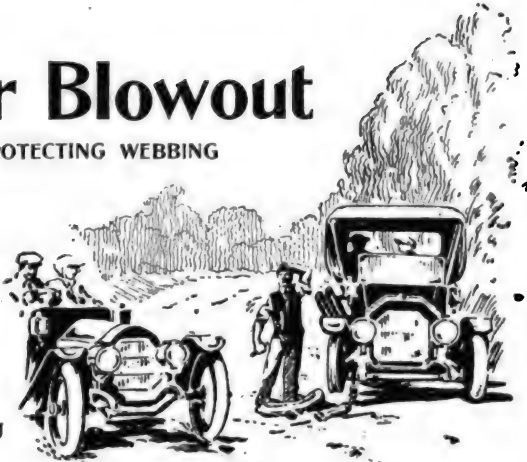
With the advent of "Bullet Proof" Waban Webbing this perpetual expense was overcome—there is no longer any excuse for tire trouble and expense.

"Bullet Proof" is a heavy webbing, simply slipped between the inner tube and casing, and is the sanest and lowest priced article for lengthening the life of tires.

Easily inserted by anyone in a few minutes.

If you are not using "Bullet Proof" you're the loser.

WRITE TODAY FOR BOOKLET J AND PRICES



Waban Webbing Co., 207 Essex St., Boston, Mass.

REAL BLOW-OUT SERVICE — THE AGRAY PATCH In Use On One-Ton Truck

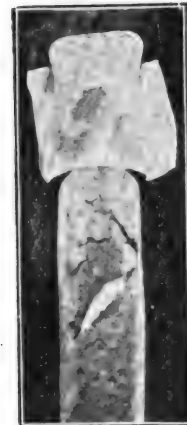
Blow-out several inches long (see photos) — shoe repaired with AGRAY PATCH. Result?—500 miles extra service. Then, tire changed, and AGRAY PATCH put back in repair kit for further use.



No. 1

No. 1 shows AGRAY PATCH in use in tire.

No. 2 shows tire and patch after 500 miles extra service.



No. 2

PRICES

3 in.....	\$0.75
3½ in....	1.00
4 in.....	1.25
4½ in....	1.50
5 in.....	1.75

Prepaid on receipt of price.

In Blow-out Patches, as in other Accessories, If It's GRAY'S, It's the Best

GRAY SPECIALTY CO., 148 Avon Ave, Newark, N. J.
JOBBER—We Want Live Inquiries—DEALERS

Reduce Your Tire Expense

ESSEX
Double Strength
Inner Sleeve



RUBBER PYRAMID MATTING
OUTSIDE TIRE BOOTS
RUBBER LAMP CONNECTIONS
RUBBER GOGGLES

By using
The BEST Reinforcements.

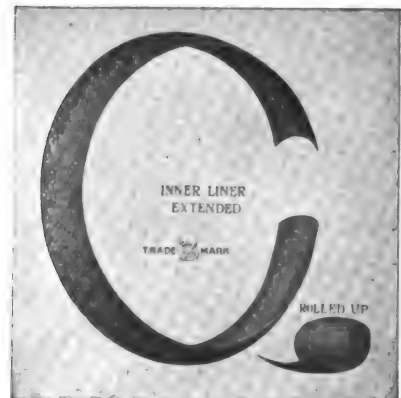
Demand ESSEX Products and secure the highest qualities at a cost no more than you pay for the ordinary kind.

Live Jobbers everywhere carry ESSEX Goods in Stock.

ESSEX RUBBER CO.
TRENTON, N. J.

WRITE FOR SOUVENIR ERASER.

ESSEX STANDARD RELINER



RUBBER SPRING BUMPERS
RUBBER GENERATOR TUBING
ASBESTOS GAS ENGINE PACKING

IF YOUR DEALER DOES NOT CARRY THIS LINE WRITE FOR CATALOGUE AND PRICES, ALSO SEND US HIS NAME.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

You Can Please Your Customers

Bring them back, and their friends with them, by using nothing but supreme quality.

"Firestone" Repair Stocks

The reputation gained by ten years of uninterrupted leadership in the tire world is back of "Firestone" Repairs, and what is more, the efficient service of these repairs, combined with easy making qualities, insures you a big steady trade quickly and satisfactorily handled.

Firestone Accessories

Cementless Patches
"Current" Gum
Wrapped Tube Patches
Molded Tube Patches
Lace-on Boots
Blowout Patches
Emergency Inside Patches

Repair Material
in Airtight Packages
Tire Tape Talc
Complete Repair Kits
Tire Pumps
Air Pressure Gauges
Valves and Valve Parts

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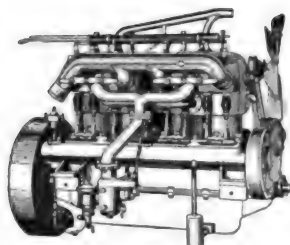
THE FIRESTONE TIRE & RUBBER CO.,

"America's Largest Exclusive Tire and Rim Makers,"

Akron, Ohio, U. S. A.

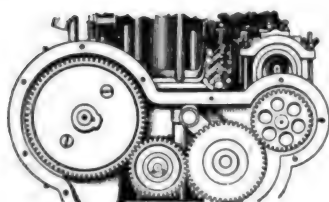
Where to Look for Loss in Power and How to Prevent it

These five parts of the motor car mechanism are the source of ninety per cent of the friction developed.



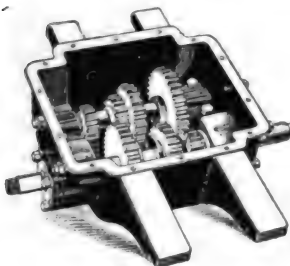
The Engine

The engine has a multiplicity of moving parts, all subject to great frictional resistance, if the oil employed is not, first and above all, high in lubricating properties. An oil which *seems* unusually good because it doesn't carbonize, may be *really* exceedingly bad, because it doesn't lubricate.



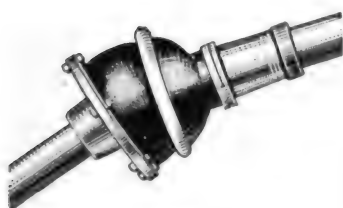
Timing Gears

Gears are greedy in devouring power. Timing gears are no exception. They need the cushioning effect of a good lubricant—one which will not thin out and will not carbonize if it should by chance work into the combustion chamber.



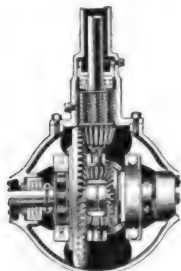
Transmission

The transmission may be the source of a ten per cent. friction loss—two horsepower out of twenty. It depends upon the lubricant you use. Stiff grease puts a tremendous overload on the driving shaft. Oil leaks out, does not cushion the teeth, and gears soon wear out. The ideal lubricant is soft in body, does not retard and does envelop and cushion the teeth.



Universal Joints

These "elbows" in the driving shaft work so hard that they destroy any kind of a low melting point grease, cause it to escape and then they get hot from high friction. When you study the make-up of a universal joint and think of its work, you can see why a good lubricant is essential.

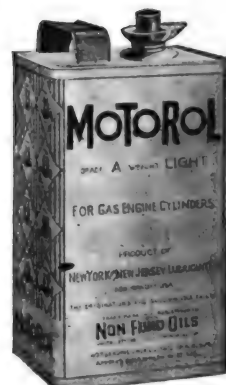


Differential

Here is where the driving power turns a corner and where the relative motions of the rear wheels are compensated. Such a mechanism is a hot-bed of friction when the lubricant fails. Bevel gears and ball and roller bearings must be unfailingly lubricated.

MoToRoL

will not carbonize any more than other oils which have not one third of its lubricating properties. MoToRoL is incomparable in economy.



"K-Forty" Grade Non-Fluid Oil

insures a low coefficient of friction, quiets the gears, does not thin out and will positively not carbonize under heat.



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has that ideal consistency which some motorists try to get by mixing oil and grease. This lubricant does not melt or congeal. It is exceedingly adhesive, hence the teeth are always thoroughly coated. Gears run quietly, shift easily and do not absorb power.



"K-000" Grade Non-Fluid Oil

resists the heavy stress in universal joints and never permits sufficient friction to develop to allow wear to occur. This lubricant wears out but does not leak out.



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has the necessary body to prevent metal to metal contact in the bevel gears and is perfectly adapted to the work of protecting balls and rollers and accelerating their motion. This lubricant will not escape through the housing to brake drums.



The next time you need lubricants, ask your dealer for NON-FLUID OIL and MoToRoL.



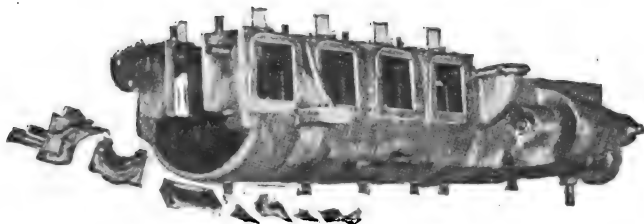
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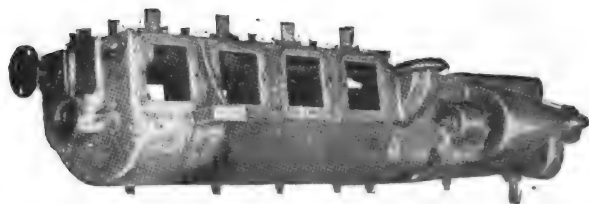
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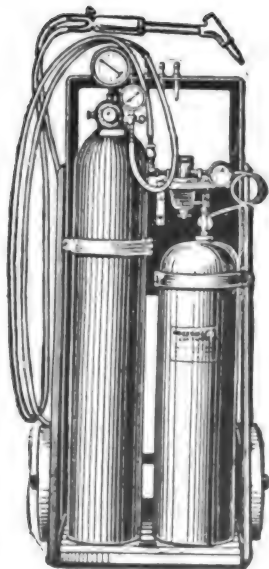
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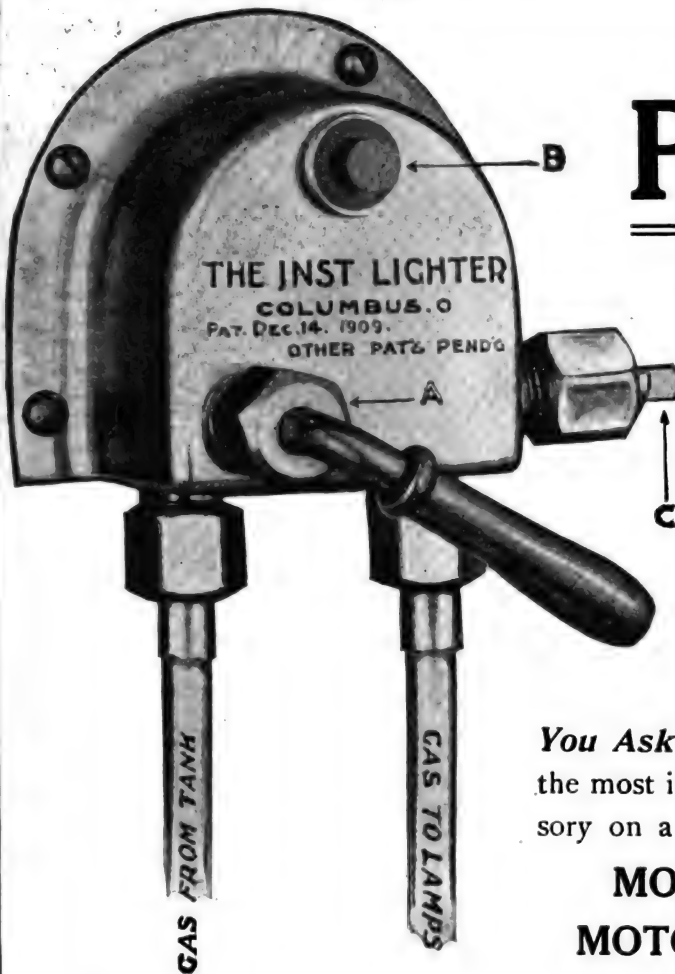
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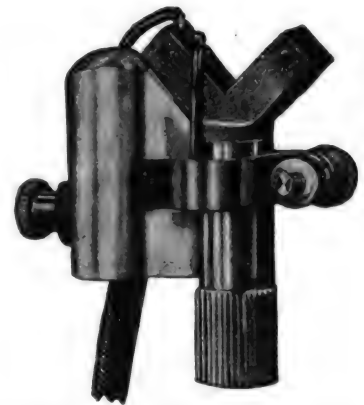
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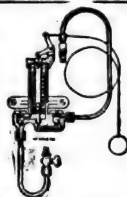
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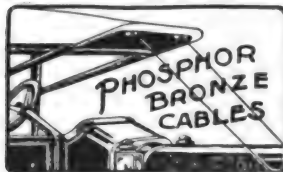
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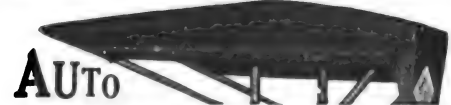
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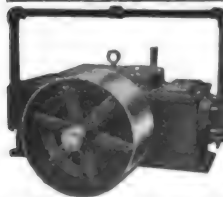
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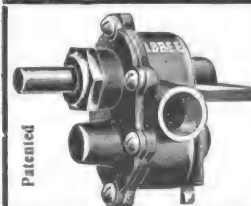
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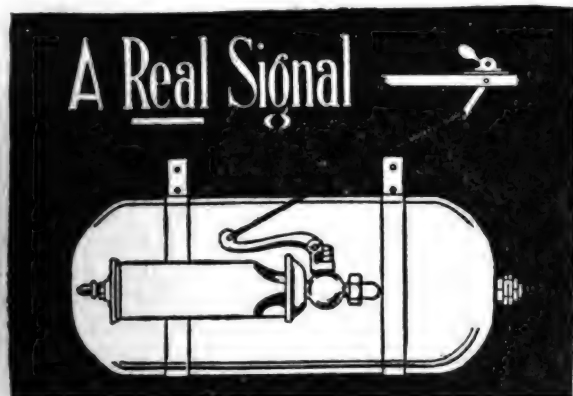
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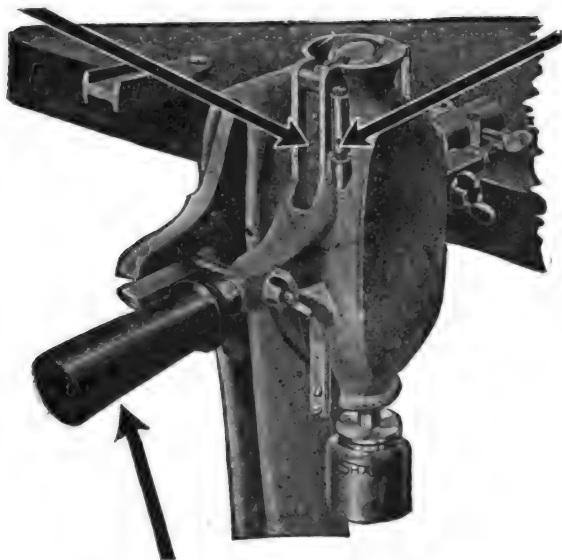
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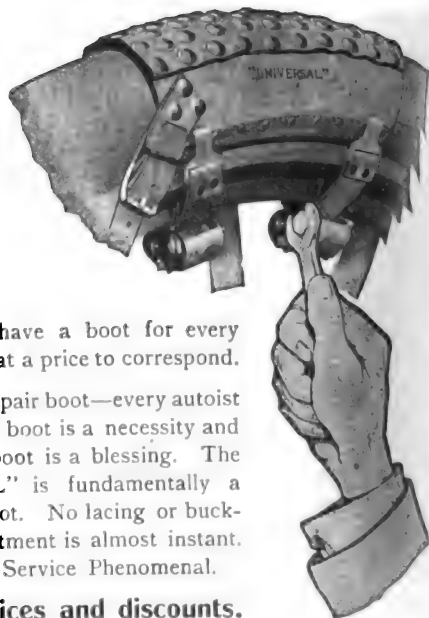


not only save your tires from the wear and tear of road contact, making new casings last indefinitely and giving renewed life to old casings, but they are superior mud and sand creepers. With your tires equipped with "UNIVERSAL" tire protectors you can go and come when you please regardless of road conditions and be certain of getting back safe and sound. No need for extra tires—no delays or annoyance and expense on account of tire trouble. The saving effected through the use of "UNIVERSAL" tire protectors will ordinarily more than pay for your gasoline and the general running expense of your car from season to season. They fit any and all makes of tires, and are as easy to install or remove as quick detachable tires. Special offer to users in unoccupied territory.

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We've been making cylinder lubricants for over a quarter of a century—isn't it reasonable to suppose that we know how to make the best?

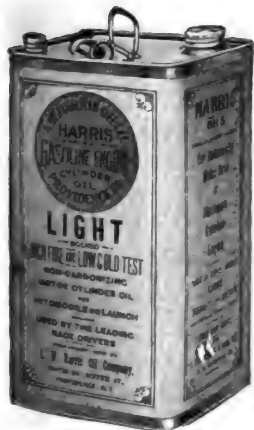
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Will give you increased mileage. Greatly reduce cost for repairs.

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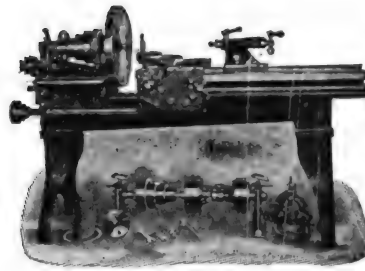


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PRICE \$20.00 Complete, including Button and Cable.

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"SAMSON" Electric Horn



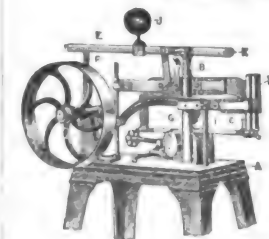
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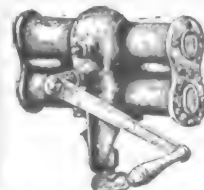
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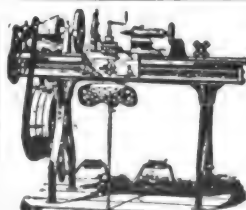
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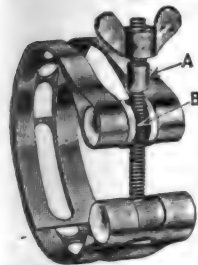
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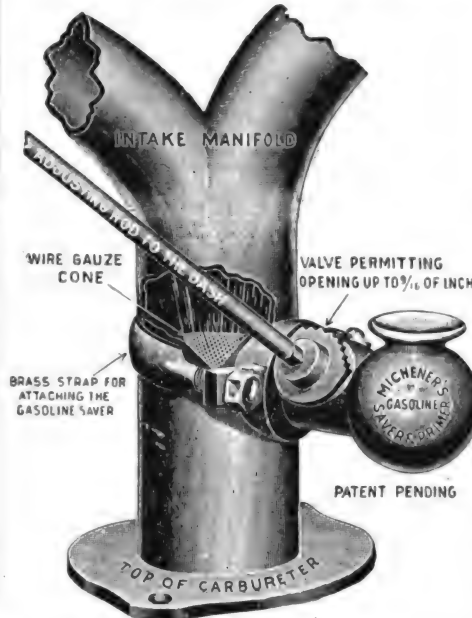
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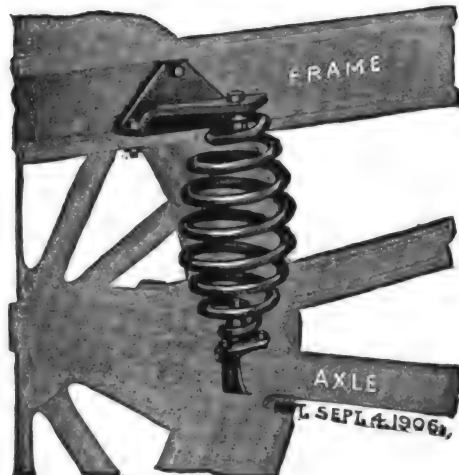
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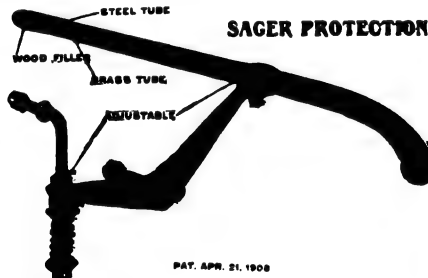
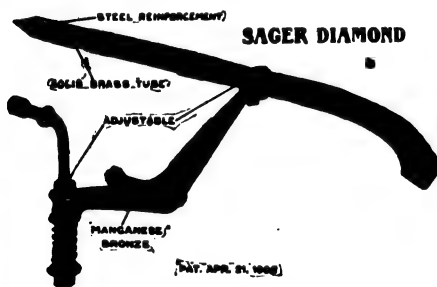
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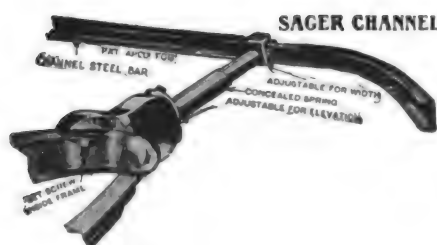
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For repairing Automobile and Bicycle tubes
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Best there is for plugging purposes.	
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Price \$2.50 per gallon, in cans.

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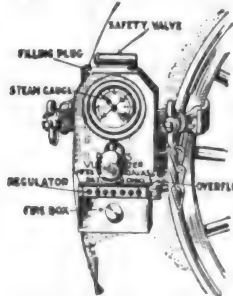
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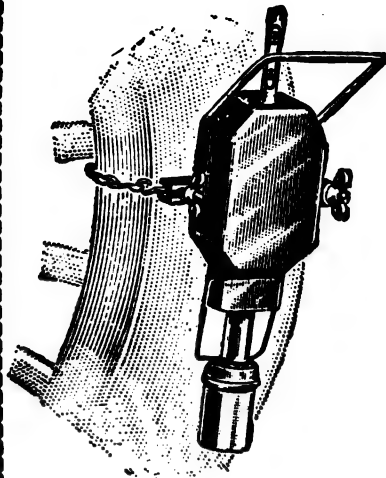
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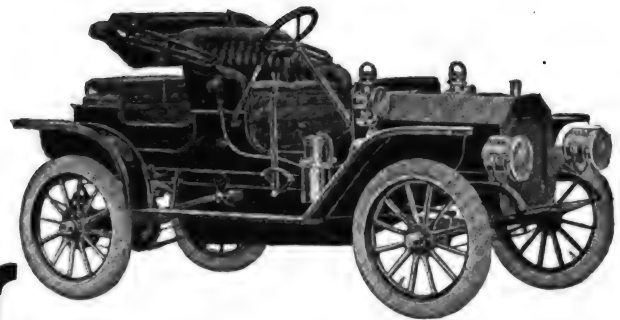
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Satisfaction Guaranteed to Everybody, or Money Back.

Don't get stung with a cheap vulcanizer. Better pay a little more for a reliable vulcanizer than to ruin a \$30 tire.

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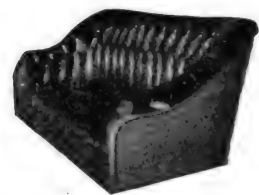


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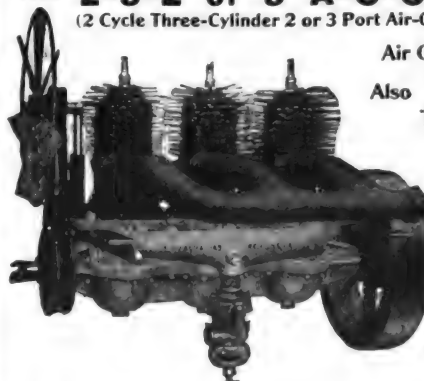
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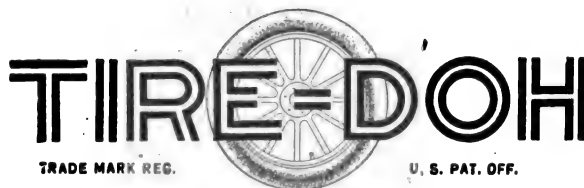
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*Repairs
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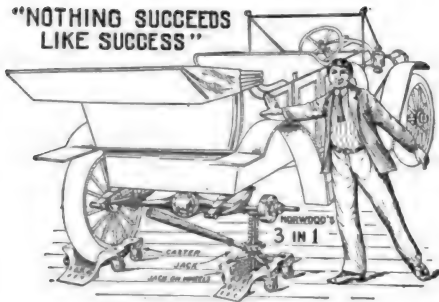
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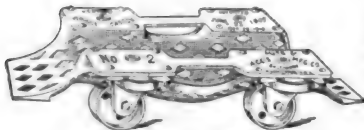
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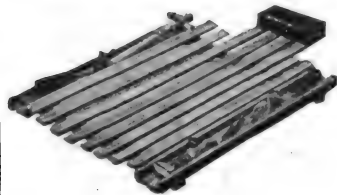


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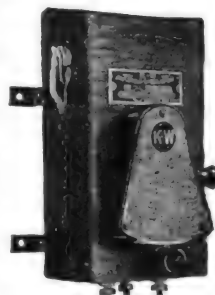
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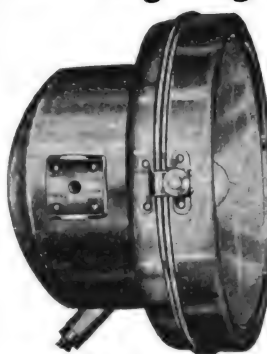


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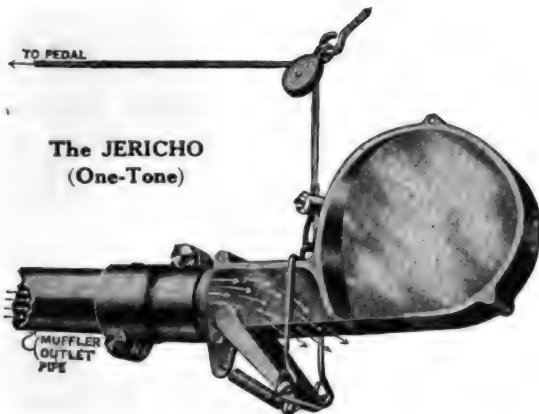
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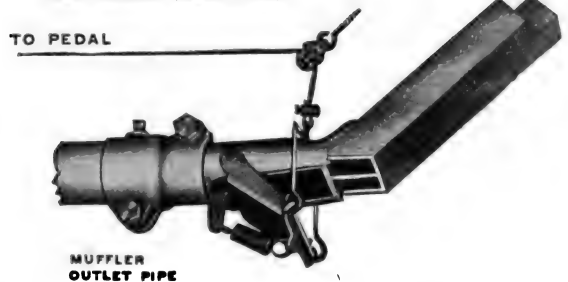
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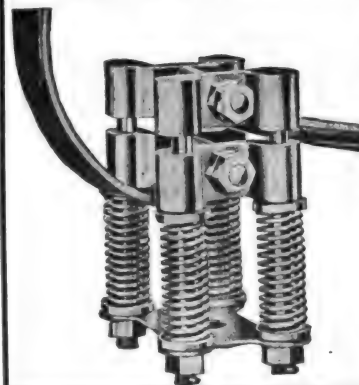
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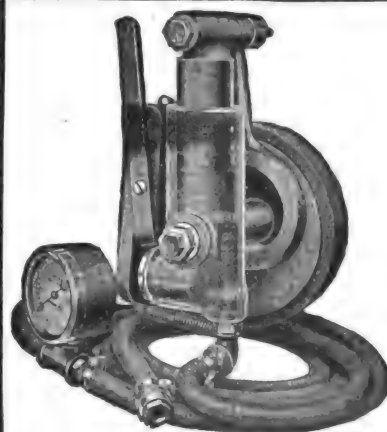
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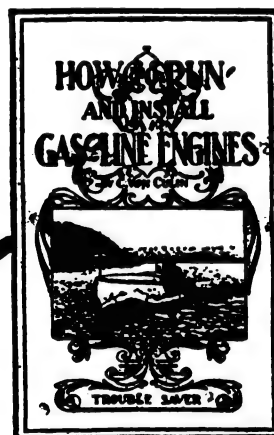
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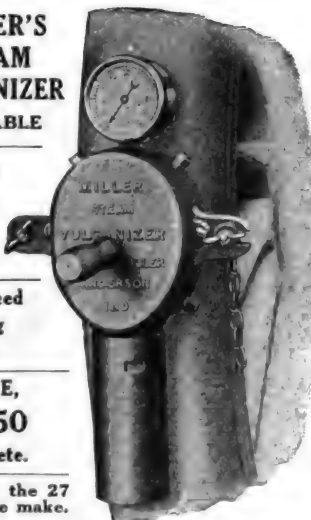
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TABLE OF CONTENTS

PAGE	PAGE	PAGE
Slide and Poppet Valves.....33	That Troublesome Grease.....50	Force Feed Lubrication.....57
The Magneto.....34	Towing a Car.....50	False and Real Economies.....58
Radiator Repair.....37	Wants to Use Natural Gas.....50	Up to the Limit.....58
A Choked Pressure Pipe for the Oil Feed.....38	Glidden Tour and the Krit Car.....50	Danger in Extremes.....58
Some Wrinkles Concerning the Engine.....38	Wiring for the Bosch Dual System.....50	In an Insane Hurry.....59
A Popping Carburetor.....38	Valve Adjustment.....51	Tire Economy.....59
How to Repair a Broken Pinion.....39	Choked Mufflers.....51	Common Sense of Speed.....59
How to Easily Start the Engine.....39	Freezing Batteries.....51	The Price of Gasoline.....59
A Broken Ball Race in the Gear Box.....39	The Repainting Question.....52	Reckless Driving.....59
A Hot Crank Case and Its Cause.....40	The Buick Motor Knock.....52	Sealed and Signed.....60
Automobile Dealers.....40	Wants to Know About Things.....52	Road Improvement.....60
A Persistent Engine.....41	The Leaking Axle.....53	Lessons for Drivers.....60
Practical Kinks for Car Mechanics.....41	Who Can Beat This?.....53	Timer Spring Tension.....61
A Self-Starter Study.....42	Spongy Vulcanized Rubber.....53	Second-Hand Cars.....61
Motor Trucks.....44	Two Faults Easily Cured.....53	Caused by the Magneto.....62
Cost of Running.....45	The Brush Misfire and Spark Plugs.....53	A Lubricating Defect.....62
Cost of Keeping an Automobile.....46	Good Advice to Drivers.....53	A Home-Made Head Lamp Bracket.....62
Oil Quantity and Quality.....46	A Good Word for Tire Treads.....54	For Home Painters.....63
A Foul Spark Plug.....46	Mr. Hampton on Knocking.....54	Accurate Temperature Control in Vulcanizing.....63
Those Rear Axles.....46	Effect on Cold Dry Cells.....54	Self-Starters.....64
Wiring and Switch Plugs.....47	A Good Ford Record.....55	Some Minor Motor Car Repairs.....66
Horsepower Formulas.....47	Leaking Differential Grease.....55	Air-Cooled Motors.....68
A Red-hot Exhaust Pipe.....47	Ignorance and Graft.....55	Help the New Owner.....68
Wires That Break.....47	For Brush Car Owners.....55	Watch Cams and Gears.....70
His Reo Touring Car.....47	A Turntable and Lifter.....55	Long Stroke Engines.....70
An Elusive Fault.....48	Why Do They?.....56	Materials for Repairs.....72
Steering Wheel and Timing.....48	Heating Transmissions.....56	More About Sam.....72
An Occasional Back Kick.....48	Cause of Spongy Vulcanized Rubber.....56	Rubber and Metal Cement.....72
Lamp Trouble.....49	Hot Water and Cold Radiator.....56	Broken Part Record.....76
Troublesome Carbon.....49	The Krit Touring Car.....56	Specific Automobile Lubrication.....77
A Good Deal of Trouble.....49	Lessons in Accidents.....56	Steam Car Department.....77
	The Local Dealer.....57	

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E. EDELMANN & CO.

231 W. Illinois St. - Chicago, Ill.

Look for the Guarantee on the etched nameplate. None genuine without it. Gauge holds the Indication until re-set by hand. Comes put up in handsome leather case.

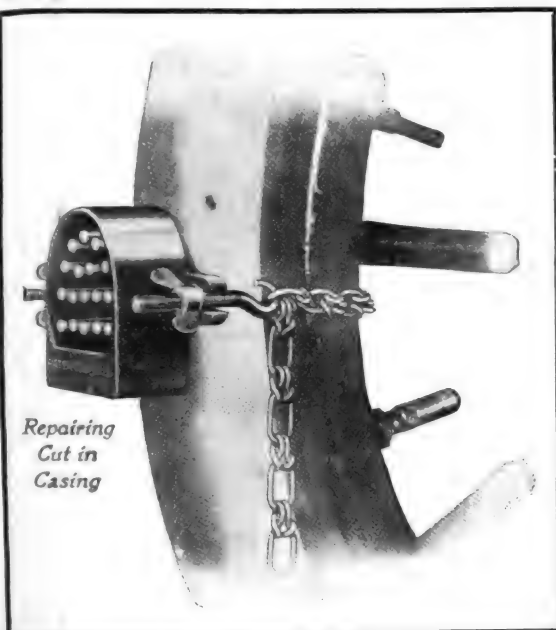
At all dealers or from us by insured mail on receipt of \$1.00. Your money returned if not satisfactory.

DON'T TAKE A SUBSTITUTE.

DEALERS: Write us for Interesting Catalog.

TO DEALERS

On April Second we were granted letters patent broadly covering the UNIVERSAL AUTO-VULCANIZER. We will prosecute promptly and vigorously all infringers thereof



*Repairing
Cut in
Casing*

*Cuts in tire casings and
punctures in inner tubes
repaired for five cents with
Adamson's*

Universal Auto-Vulcanizer

PATENTED

THIS little device is a wonder. It weighs three pounds, boxed, with complete outfit of repair gum, etc., and can be carried in any car. Apply it to tube or casing as shown. Put in the small amount of gasoline required. Touch

a match to it. In fifteen minutes you have as good a job of vulcanized patching as your repair shop can do—and at the price of car fare.

❑ So simple any woman can do it. Absolutely automatic. Cannot overheat or underheat. No cement; no acid. Just the vulcanizer, a little gasoline, the rubber patch—and a match.

❑ Every car owner should have one. Cost \$4.00. Saves its price in less than a month. Your dealer ought to have it in stock. If not, fill out the blank below and send to us. You get the vulcanizer by express at once. Money returned if unsatisfactory.

Adamson Manufacturing Company

EAST PALESTINE, OHIO

ADAMSON MFG. CO.
EAST PALESTINE, OHIO

Gentlemen:

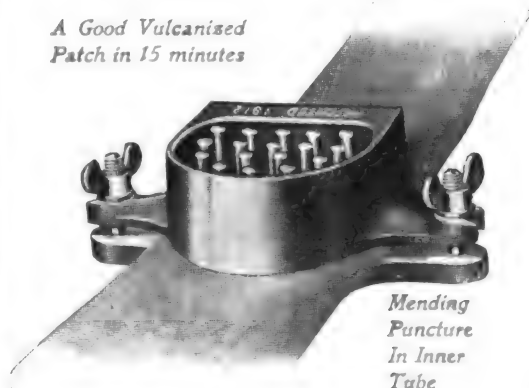
I cannot get a Universal Auto-Vulcanizer outfit from my dealer. Enclosed is \$4.00. Please send me one express prepaid.

Name.....

Town.....

State

*A Good Vulcanized
Patch in 15 minutes*



*Mending
Puncture
In Inner
Tube*

This advertisement is being run in all the leading Automobile Papers. You will have a large demand for this device. There is a handsome profit for you in its sale. We wish to distribute it through the TRADE. Write to your jobber or to us today.

K & W TIRE ACCESSORY CATALOG

Tire Trouble Successfully Eliminated



K & W Mfg. Co., Ashland, Ohio

OUR GUARANTEE

Our K & W Patent Reliners will reinforce the whole inside of the tire as much as an inside blow-out patch will a small section, that they will not injure the inner tube when properly inserted in the tire according to our directions, that they will decrease the danger of puncture at least 80 per cent., and that they will be satisfactory to you.

Reliners will be replaced or money refunded if same do not do as we claim.

RELIABILITY

THE ASHLAND BANK AND SAVINGS CO.
ASHLAND, OHIO.

CAPITAL, \$100,000.00

Aug. 23rd, 1910.

This is to certify that we have known the K. and W. Mfg. Co. since they began business. They are prompt in payment of all bills and carry out every contract they make to the letter. We have no hesitancy in recommending them unreservedly.

Very truly yours,

Chas. L. Young Cashier.

K & W Mfg. Co., Ashland, Ohio

EVERY DEALER AND CONSUMER SHOULD HAVE THIS CATALOG

Hundreds of Dealers are making a nice profit by selling K & W Tire Accessories, and Consumers *everywhere* are saving tens of thousands of dollars and almost all their Tire Trouble by using them.

Our K & W Patent Reliners *are so successful* that fifty Reliner Firms are to-day trying to "imitate" them. But we are the Patentees,—

THE SUCCESSFUL PIONEER RELINER MANUFACTURERS

and the first to ever use the term "Reliner."

We make the best Reliners and Tire Accessories for consumers to use and offer the dealer the best Selling Proposition.

A Postal card will bring you our K & W TIRE ACCESSORY CATALOG and a Special Proposition on a trial order if we have no dealer in your vicinity.

K & W MANUFACTURING COMPANY

DENVER BRANCH
1545 Broadway, Denver, Colorado

MAIN OFFICE and FACTORY
3rd Street, ASHLAND, OHIO

Automobile Dealer and Repairer



A JOURNAL OF PRACTICAL MOTORING

REGISTERED IN U. S. PATENT OFFICE.

THE MOTOR VEHICLE PUBLISHING CO., 71-73 Murray Street, New York.

Vol. 13, No. 4

NEW YORK, JUNE, 1912.

Monthly, \$1.00 per year.
Single Copy 10 Cents.

Save 9/10 of Your Tire Repair Expense

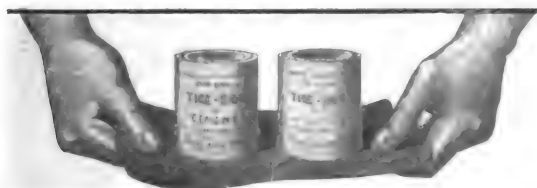


Here's all you need to repair
the worst puncture or blowout—
—a Tire-Doh Outfit, Price \$2.

With your two hands and a Tire-Doh Outfit
you can **permanently** repair every injury that can happen
to a tube or casing—puncture, blowout, cut, **any** injury.

You can fix the biggest hole with Tire-Doh. Simply clean around the hole with gasoline, apply a little Tire-Doh Cement (comes with the outfit), and knead in Tire-Doh. That's all there is to repairing tube or casing. Takes only a few minutes, costs about 5 cents, and the repair lasts.

Remember, Tire-Doh doesn't make a "pasted on" patch. Tire-Doh kneads into and becomes a



Note:—The complete outfit consists of a can of Tire-Doh, a can of Tire-Doh Cement (enough for 50 punctures), and one Inside Casing Patch. It all comes neatly packed in a large white enameled can.



part of the tire, as tough and elastic as the tire itself. You can't pull off a Tire-Doh repair. You can't weaken it. Pump up your tire to the limit. It's new again so far as that particular place is concerned.

Cure those little cuts, bruises and sand pockets with Tire-Doh. Makes casings last twice as long.

Price of Tire-Doh Outfit, \$2 at your dealer's or shipped express prepaid by us upon receipt of \$2. Money back if you ever ask it. Over 90,000 Tire-Doh outfits sold to date and only 27 purchasers have asked for money back.

Send Postal for Free Sample Patch

If you want to be shown first, just say on a postal "Send sample Tire-Doh patch," and we'll send it free.

Atlas Auto Supply Co., 77 E. Adams St., Chicago



K&W RELINERS

$\frac{1}{2}$ of 1%

That's the number of replacements that we have had to make during the four years we have had K & W Reliners on the market. The best of material, combined with the best of workmanship, are responsible for the superiority of K & W Reliners.

When a dealer tries to sell you "something just as good" as "K & W"—take the hint. Write us direct. Don't wait for blow-outs and punctures, but reinforce your tires now. Take time by the forelock and double your mileage. K & W Reliners will add 3000 to 5000 more miles to your tires—service practically equal to that given by new standard made tires.

The fabric is the life of the tire. By reinforcing the fabric you get many additional miles of service, besides making punctures and blow-outs impossible. K & W Reliners will easily reduce your tire expense 50 per cent.

When placed in an old casing, a K & W practically vulcanizes itself to the inner fabric and covers up all the cracks and worn spots; reinforces the whole tire in exactly the same way that an inside blow-out patch reinforces one weak spot.

The exclusive features found in K & W Reliners are fully covered by patents and cannot be found in any other reliner made. Every K & W Patented Reliner is backed by our positive guarantee of service and satisfaction.

Dandy Reliners.

As there are many instances where a Reliner would do all work required by reinforcing and preventing punctures (and sometimes not necessary to be made of as good material as our K & W Patent Reliners) we have decided to manufacture a reliable, low priced tire-reinforcement and have succeeded so well that "price and quality" will satisfy any one who is satisfied with any other tire protector on the market.

The Dandy Reliner is built wide. It will reinforce the casing at the edges. It is made of from three to five plies of heavy rubber duck. It is neatly made. It will fit the tire perfectly. It is heavily coated with cement—all ready to insert. It is semi-cured and very pliable. You will be well pleased with the Dandy Reliner.

We also manufacture a LIGHT WEIGHT Reliner made of "two" layers. The LIGHT WEIGHT is excellent for a tire that is "Rough Inside."

PRICE LIST.

	Dandy Reliner	Light Weight Reliner
28x2½	\$2.60	\$2.40
28x3	3.10	2.90
30x3	3.40	3.25
32x3	3.60	3.30
28x3½	3.90	3.50
30x3½	4.05	3.60
32x3½	4.30	3.75
34x3½	4.50	3.85
36x3½	4.70	4.00
30x4	4.90	3.60
31x4	5.20	3.80
32x4	5.40	4.00
33x4	5.50	4.20
34x4	5.70	4.30
36x4	5.85	4.40
34x4½	6.30	4.55
36x4½	6.65	4.80
34x5	6.80	4.85
36x5	7.00	5.25

Write for our K & W Tire Accessory Catalog, containing prices of our "Patent" Reliners. See your Dealer—if he does not sell K & W PRODUCTS, write us for a special price.

K & W MANUFACTURING COMPANY

Denver Branch: 1545 Broadway, Denver Colorado

MAIN OFFICE AND FACTORY: 3rd Street, Ashland, Ohio



Enjoy the View!

You can pay a better compliment to the scenery of your vacation tour than to make it the back-drop or a tire-repairing act. Mount Washington and the Delaware Water Gap can't be stowed in a suit case and carried away as trophies. It's best to enjoy them—thoroughly—while you can.

You may abolish the costly nuisance of tire-repairing once for all, by the simple process of transferring the road wear to glass-hard steel rivets. Punctures and cuts are eliminated by the same means; and the fabric life of new tires is **multiplied by three**, because, with the rubber surface unbroken, local rotting no longer occurs.

Woodworth Treads

cost about half as much as the tires they cover, and last as long as ordinary bare "shoes." Once on, they stay on till worn out. Stiff side springs prevent loosening and chafing. Dirt cannot enter to do harm, and thousands of miles of service barely mark the rubber. The chrome leather base is **permanently** soft, pliable, and easy-riding.

MINGO JUNCTION, OHIO, Nov. 6, '11.

GENTLEMEN:—I want you to know that it has been a great pleasure to me to start on a tour and feel safe as far as tire trouble was concerned. I did not have the air out of my tires from the day I placed the Woodworth Treads on.

Yours very truly,

H. G. BROWN,
Care of Carnegie Steel Co.

BYRON, OKLA., May 1, '11.

GENTLEMEN:—Some months ago I bought from you the second pair of treads and have never had a puncture from the use of them, for by the use of them have prevented all punctures and blow-outs. This last pair I have kept on all the time since I bought them, and the metal buttons on the face are not worn at all. I am very much in love with your latest improvements on the treads.

J. M. GAUME, M. D.

If you are not using Woodworth Treads you are paying more than they cost for trouble instead of service. Let us tell you more about them, and send our booklet on Tire Preservation. It is useful to every owner of pneumatic tires, whether he uses Woodworth Treads or not. We will mail a handy leather key ring **free** if you mention this magazine.

We will repair or replace on a mileage basis any Woodworth Tread which fails to come up to our guarantee of service, and will repair or replace free of charge any tire which is damaged by Woodworth Treads when applied as we instruct.

LEATHER TIRE GOODS CO.
NIAGARA FALLS, N. Y.





The NATIONAL STARTER

Securely Founded Upon Right Principles

Of all types of starters to-day on the market none is more simple and direct in its action than the NATIONAL. Dependent upon no other source of energy than that derived from a simple pressure of the foot, it is free from all the trouble connected with starters operating on the acetylene gas, electric, compressed air and spring principle. It is built on a trouble-proof, mechanical principle, the efficiency of which has been proved in actual test 100% perfect.

In point of safety the NATIONAL proffers to motorists not only all the security of starting from the seat, but also the insurance against the dangers which of necessity are connected with starters which operate on an explosive principle. You will never blow out a cylinder head or set your car on fire if your starter is a NATIONAL.

Certainty of starting is the NATIONAL watchword—100 times out of 100 to-day, to-morrow and 5 years from now. Its efficiency is flawless—100% perfect. It will start your car regardless of whether your gas tank is empty or full, your storage batteries fresh or exhausted. You don't have to tinker with a switch, a pump, a handle, or a gas distributor *before* you start. One operation—that of simply pressing the dash pedal—is all sufficient to get any car under way at any time.

NATIONAL ECONOMY exhibits itself to the motorist by an absence of upkeep expense and repair bills. There are no charges for gas or electricity. It costs nothing to operate a NATIONAL. It never requires the services of a mechanic to make it work. It never necessitates having the motor decarbonized. No bills accumulate on these scores—you pay for your NATIONAL but *once*.

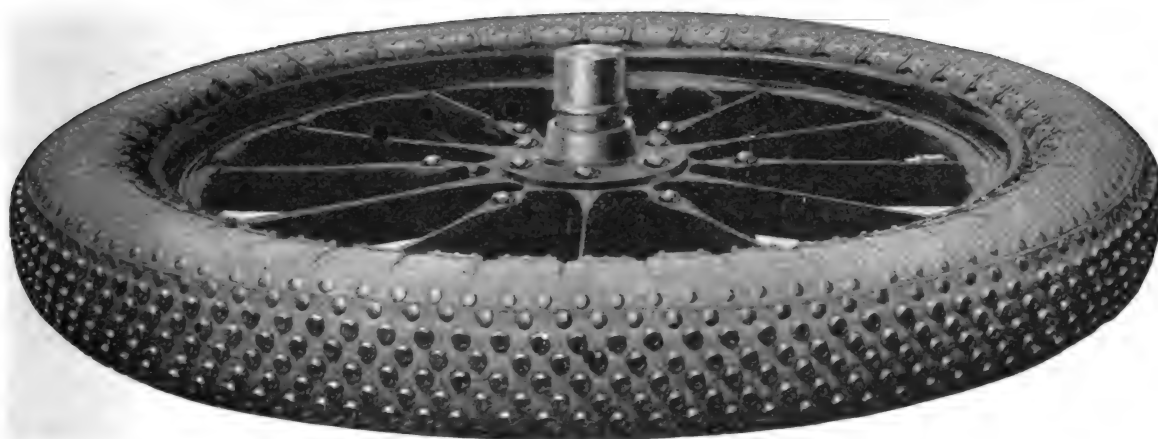
The Starter Complete, Attached to Car—\$50.00

Write for Information

Energetic Dealers Wanted Everywhere!

The National Gas Engine Starter Co.
30-32 No. Dearborn St., Chicago, Ill.

SIMPLICITY SAFETY CERTAINTY ECONOMY



Is it POSSIBLE This Guarantee is TRUE?

This is the most remarkable Tire Protector guarantee ever heard of. It is so broad—so liberal. It's almost unbelievable. No other protector gives such a guarantee. We do—because Durable Treads can back it! This is it—read it carefully.

Guaranteed 5,000 Miles Without Puncture

We will give you a written guarantee—legal and iron-clad—with Durable Treads for 5,000 miles without puncture. This guarantee guarantees that Durable Treads will not rot, heat or injure your tires in any way. 5,000 miles without puncture stands whether your tires are new or old, tread-worn, run-worn or rim-cut.

Did you ever hear of such a guarantee before? Do you know just what it means? It means a saving for you of just about half your tire expenses. If you don't know what that means, listen to these figures:

Your tire-wear costs you, without Durable Treads, from 1½ to 4 cents per mile for every mile your car travels. This season it will be from \$50.00 to \$200.00, according to the size of your tires.

With Durable Treads, this expense will simmer down to half. They cost only about half as much as tires. They are made for either straight-side or clincher rims.

Day by day car-owners are awakening! Day by day Durable Treads are becoming the standard protection against the bane of car-owners' lives—tire expense.

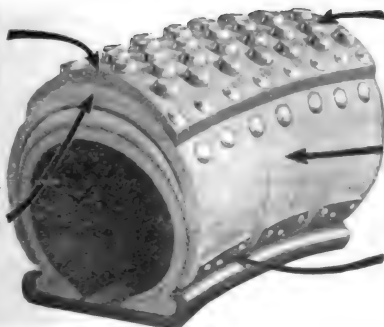
Durable Treads must do exactly as we claim. If they fail, we lose—not you. If you are skeptical, it makes no difference. We expect you to be—others have been. But they were willing to be shown. So we showed them—at our risk. We want to show you, so read "Special Offer" below.

Durable Treads

Exclusive Features

Extra Tread Strip covers wearing surface, adding 50% to the life of the Protector.

3 to 5 plies of Fire Fabric prevent stretching or sagging.



Hardened Steel Rivets, closely set on Tread surface, prevent skidding.

Full Leather Cover protects Tire against Ruts and Blow-outs.

Nickel Steel rim attachment places driving strain on wheel instead of on worn or weakened tire. It prevents rim-cuts and Blow-outs.

Special Offer!

If Durable Treads are not already represented in your territory, we will ship you a pair or full set for inspection. You pay nothing in advance. If you are not satisfied that they will save half your tire expense, return them.

Further, we will allow you on this initial order, full dealers' discount, simply as an extra inducement.

If the saving of half is worth anything to you, send the coupon below for a copy of our guarantee and our interesting booklet: 5,000 Miles Without Puncture—FREE. It describes Durable Treads and Durable Blow-out Patches—it may mean the end of your tire troubles.

Mail Coupon—Get Facts!

COLORADO TIRE & LEATHER CO.,

1027 BROADWAY, DENVER, COLO.

Dear Sirs—Send me, at once, without obligating me, your new book, "5,000 Miles Without Puncture."

Name.....

Street Address.....

City..... State.....

My Tire Sizes are.....

Colorado Tire & Leather Co., 1027 Broadway, Denver, Colo.



TRADE-MARK

CHAMPION SPARK PLUGS



CHAMPION X
75 Cents

The demand of the most of the manufacturers for Champion Spark Plugs is what has built the tremendous Champion factory—the greatest plant for the manufacture of these accessories in the world. We need make no rash statements. Unrefutable testimony to the merit of Champions is this wonderful factory and equipment of 60 out of every 100 of the models of the 1912 year. The more cars the huge Ford and Overland factories turn out the greater our factory grows. These big makers are only two of fifty who specify Champions.

What is demanded by this great army of motorists must be best. It behooves you to investigate Champions at once. They are the surest acting plugs made; they are always thoroughly dependable.

Stocks are up to the minute; you never secure obsolete Champions. Dealers who find a preference for one type are urged to exchange their other styles.

They come in a box bearing the "world" trade mark and "Champion" is stamped on the porcelain. Manufacturers and dealers, write us today concerning 1913.



Where Champion Spark Plugs are made in Toledo

CHAMPION SPARK PLUG COMPANY

Dept. F, TOLEDO, OHIO



The Soap-Proof Varnish

Your car is to-day, *every day*, receiving a rough and ready bath of soapy water, made doubly effective by the good stout stream of a hose.

Yes, this takes off the caked mud, glued on by the road oil.

But it also kills the varnish.

There is such a varnish, and only one. We have perfected

Look at the hood, fenders and wheels of your car if you doubt it.

You say you would be happy if there were a finish which would stay on your car, and keep its fresh new appearance indefinitely, not affected by soapy water, road oil, mud and the sand blast of the road.

VANADIUM CHASSIS FINISHING

after three years of experiments and service tests. No matter what other varnish it is compared with, the results are always the same. It lasts from five to ten times as long in the laboratory or on the car in use.

Here is a proof:

If Vanadium Chassis Finishing is put into a strong soap solution it stays bright and hard for hours. All other varnishes under this treatment are rapidly reduced to the consistency of cheese and absolutely lose their lustre. **Our own old line varnishes are no exception.** This test is equivalent to a daily washdown in the garage for an entire season.

Have the hoods, fenders and underparts of your car revarnished with Vanadium Chassis Finishing. They will look new and they will stay that way.

Tell your painter you want this material used, or you yourself send to us for two quarts of Vanadium Chassis Finishing, sufficient for a large car. Price, \$1.25 a quart.

The best varnish for the body is Valentine's Vanadium Body Varnish. Together these two varnishes give the best possible finish.

Mail coupon for booklet: "How to Have a New Car All the Time."

Valentine & Company

456 Fourth Ave., New York 343 S. Dearborn St., Chicago
74 Pearl St., Boston

TRADE **VALENTINE'S** MARK
VARNISHES

Name.....
Address.....
City.....
State.....
Sign and mail to
Valentine & Company
New York
City.

Please mention the Automobile Dealer and Repairer when writing to advertisers.



**Insist on this
Label**

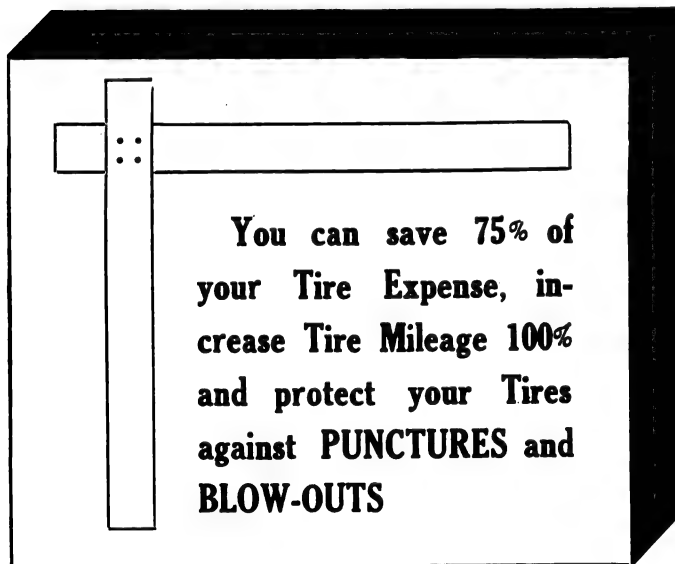
THE "INNERSHU"



**It is found on
Every "Innershu"**



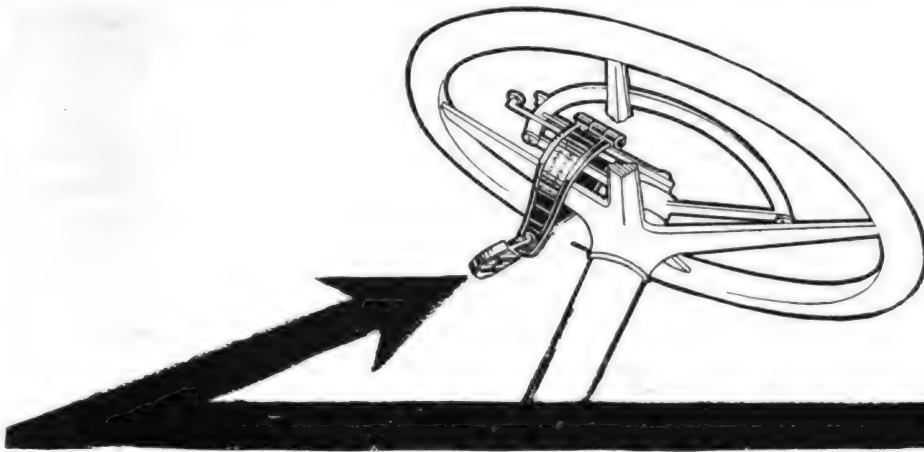
**A 100% Increase in Tire Efficiency
GUARANTEED**



**We will ship DIRECT IF not represented in
your territory**

INNER SHOE TIRE CO., Grand Rapids, Michigan

Please mention the Automobile Dealer and Repairer when writing to advertisers.



Get This Sure Protection Against Car Robbers

The automobile has opened a new field for thievery. Un-guarded cars are stolen every day. Over 5,000 owners suffered last year. Thousands more will undoubtedly suffer this year. Insurance records show that 90% of the stolen cars are abandoned after a smash-up, or after most of the equipment has been stolen. In either case the loss is heavy. Why risk it? Absolute protection forever costs but \$2.00— one cent a day for 200 days.

The Watch Dog Lock

PATENT APPLIED FOR.

In ten seconds, right from the seat, you can lock the gas, spark and steering wheel, with the motor "dead" or running. Either way, your car can never be started or steered until the "Watch Dog" is unlocked.

Safer Than a Garage

No keys on earth, save two we give you, will fit **your** "Watch Dog." So the "Watch Dog" protection is absolute. It makes your car safe **anywhere**—for any length of time. You are relieved of worry—insured against loss.

Your Car Deserves It

Many pay \$500.00 to \$5000.00 for a car without giving a thought to its safety when left alone. So the newspapers are full of automobile robberies by joy riders and equipment thieves.

Your car is surely worth more than \$2.00! The value of **your** car merits this small investment! **Your** car deserves this **sure protection!**

MAIL COUPON NOW!

Forget about the price of the "Watch Dog." Think of what your **car** cost. And remember what danger it is in until the "Watch Dog" locks it against all chance of thievery. Mail the coupon **now**. Address

S. Breakstone
1712 MICHIGAN AVE. CHICAGO, ILL.

Order Coupon
S. Breakstone,
1712 Michigan Ave., Chicago, Ill.
Name.....
Address.....
Here is my name and address.
I enclose \$2.00 for which
send me one "Watch
Dog" Lock,
complete.

Going! Going! Gone!!

The Careless Expensive Way.



A New Tire

After 400 miles the tire is cut by a sharp stone or a piece of glass.

After 800 miles, the tire cut has been enlarged and one edge torn loose from the fabric.

After 1200 miles, the hole is still further enlarged and dirt has been forced under the tread forming a "sand-pocket."

After 1500 miles, the inner-tube has blown clear through the casing--throw it into the junk-heap



This first series of pictures shows the life of an average tire, *your tire*, under ordinary every-day treatment. A small cut, a little neglect, sand and water ground into the hole every time the wheel goes around, the result is always the same, rotted fabric and a ruined tire.

Next time you dig up \$40.00 for a new casing, just remember that it is money thrown away. The old tire might just as well have run 10,000 miles. The new one *will* run 10,000 miles if you vulcanize it with a

SHALER Vulcanizer

The Shaler Way.

Clean the cut with gasoline and sand-paper.

Fill the hole with Para Rubber.

Clamp on your Shaler Vulcanizer for a few minutes.

Result, a perfect weld of the old and new rubber. A blow-out avoided; tire as good as new.



The Shaler is a complete outfit for tire repairs. It is the only vulcanizer with a temperature control that is *automatic*. No attention required after you put it on the tire. Best of all, you don't have to take the tire off the wheel--the job is done in less time than it requires to remove and replace a tire.

This series shows the life of a tire taken care of in the *Shaler Way*. You or your chauffeur can do the work. The Shaler book of instructions explains every detail of the process perfectly.

Get a Shaler Vulcanizer, go over your tires once a month and seal the cuts and sand-pockets with new, live Pararubber. Rotting of the fabric, blow-outs, and other tire trouble will be eliminated. *You will make one tire outwear three.*

Get a Free Copy of this Book.

"Care and Repair of Tires" tells what you need to know about every tire emergency. A new edition is just off the press. We'll mail you a copy free if you ask for it while the edition lasts.

C. A. Shaler Co., 805 4th St., Waupun, Wis.

Nobby Tread Wins

The suit which has been pending against The Famous Nobby Tread Tire has been won, and won without recourse on the part of the complainant by the United States Tire Company. The greatest non-skid tire ever produced thus continues to be the exclusive property of America's predominant tire concern.

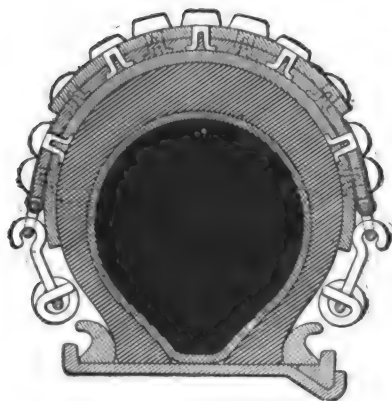
Nobby Treads Will Stop Your Skidding

Sold Everywhere

United States Tire Company, New York

Dealers will please post this important announcement in their windows.

The A. S. B. Triple Leather Tire Protector.



THE A. S. B. Treads are made of 3 thicknesses of leather from the best imported hides. It is Chrome Tanned in the U. S. and is guaranteed to us. It is ten times tougher than rubber. A ten-penny nail will bend before it will go through it. It is next to impossible to puncture it. Our leather is waterproofed. It will not get hard nor crack after being exposed to water or snow. These Treads are all full-steel-studded, with hard steel studs in the center. The side rivets are of a softer steel to better prevent skidding.

Our Treads are self-adjusting, as our springs on the sides of the Tread are made of No. 10 gauge steel wire of the very best and are $\frac{5}{8}$ of an inch in diameter. This makes a perfect, strong spring and keeps the Tread tight on the tire at all times. The springs are much nearer the center of the wheel than the face of the Tread. This gives them greater leverage, or rather tension, and is bound to keep them tight. These springs never lose their spring quality as they are made of the right diameter for a No. 10 gauge premier steel wire. They allow flexibility. That relieves the tires of practically all side strain and eventually prevents blow-outs, for the side strain is what wears and breaks the side-walls of the casing and causes blow-outs. These springs keep the Tread on straight and tight. They do not slip and crawl on the tire and destroy the power of your car at times when your power is most needed. We feel safe in saying the A. S. B. Treads are the only self-adjusting non-creep Treads made.

Our Guarantee! We guarantee the A. S. B. Treads to not heat, chafe, rot or injure your tires in any way. If they are not everything we claim them to be, you can return them at the end of 10 days' trial and we will refund your money. The A. S. B. Treads are not an experiment. They have been tested out for the past two seasons. They are giving universal satisfaction and are doing the business. As they do not slip and crawl on the tire we are safe in backing up every A. S. B. Tread that leaves our works with the above Guarantee.

They will more than double the life of your tires and will do away with at least 95 per cent of your tire troubles and that means cutting your tire up-keep expense to a minimum. We Guarantee 4000 miles wear without puncture. Some of the drivers abuse their Treads the same as they would their tires and we are obliged to place the mileage that low, but with decent usage under ordinary conditions they will give from 8 to 10 thousand miles wear. That depends entirely on the condition of the roads traveled and on the manner in which the driver handles the car.

The side-openings prevent the sides from puckering or pocketing. They will not pick up dirt nor sand. They aid in cooling the tire. By an actual test it was proved that tires equipped with A. S. B. Treads run several degrees cooler than the naked tires.

We want an Agency in every town in the U. S. If there is no Agent in your territory, we will make you a Special Price on a full set of four in order to get them on a car where all the Car Owners can see just what we they are. The Treads will get the Repeat Orders, and that is what we are after.

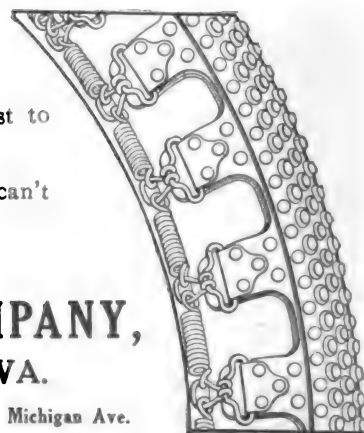
If you are tired of paying excessive tire bills, it will be to your interest to write us for prices, terms, etc.

If you are a Dealer, we have a proposition to offer you that you can't afford to pass up.

Our References—Any Bank in our City.

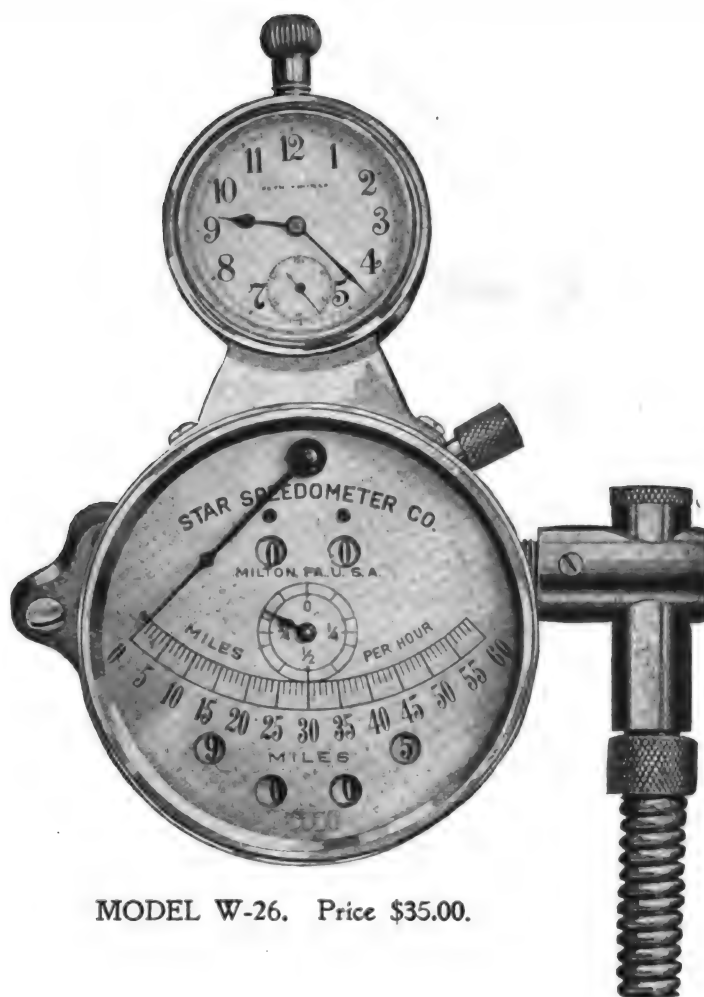
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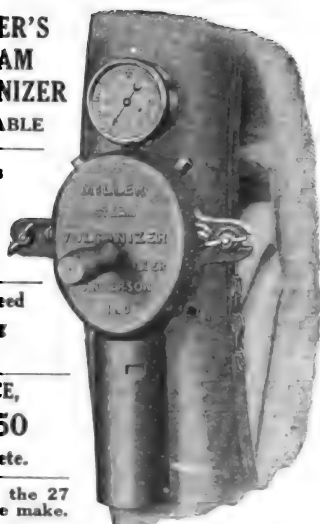
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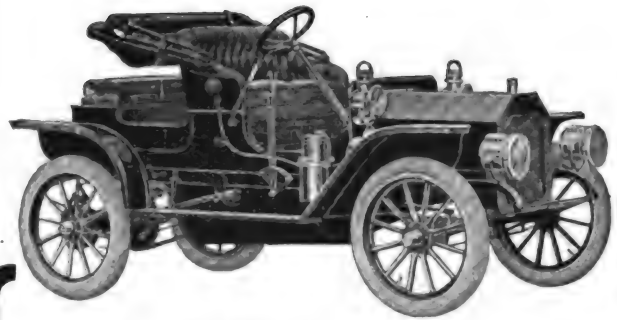
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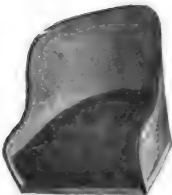
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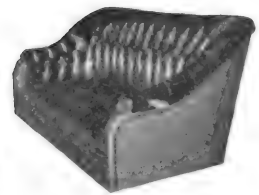
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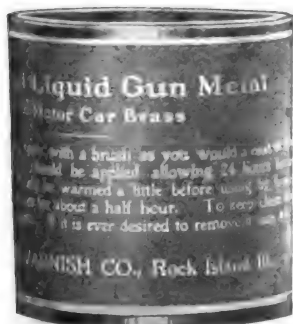
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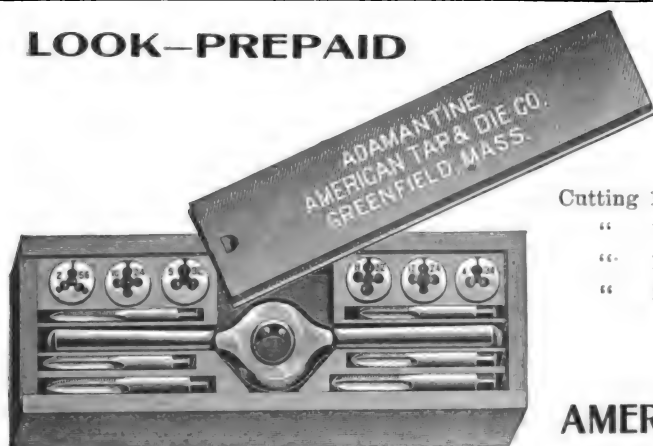


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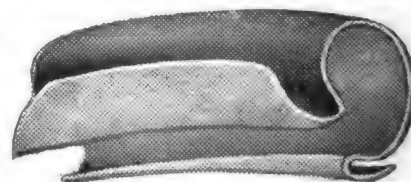
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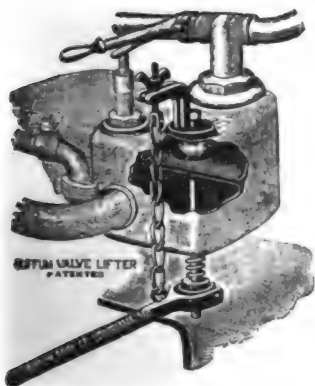
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Badger Wind Shields

PATENT APPLIED FOR

Badger Rear End Demountable
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AUTO PARTS MFG. CO.

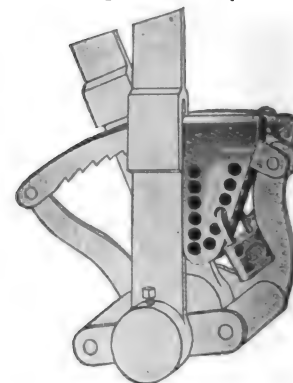
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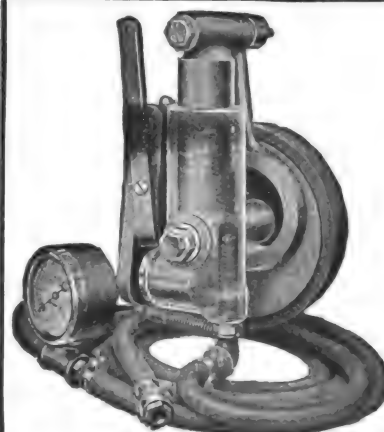


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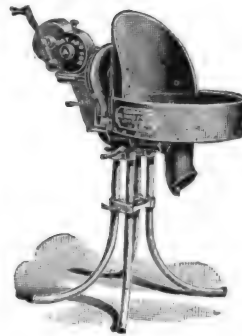


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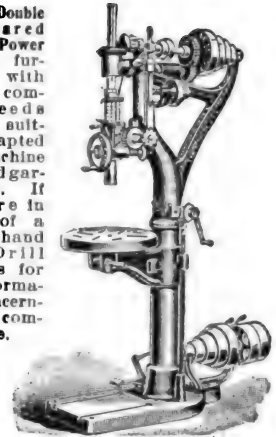
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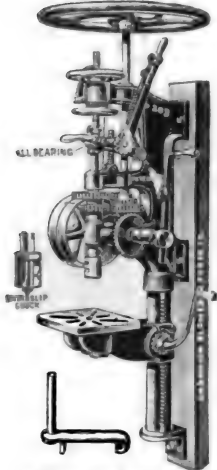


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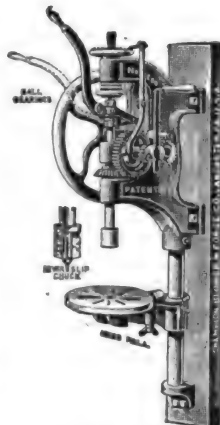
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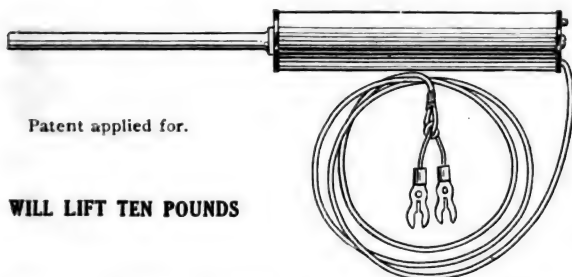
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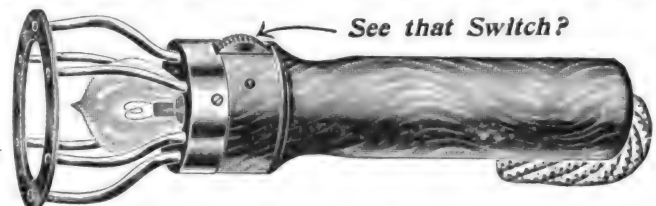
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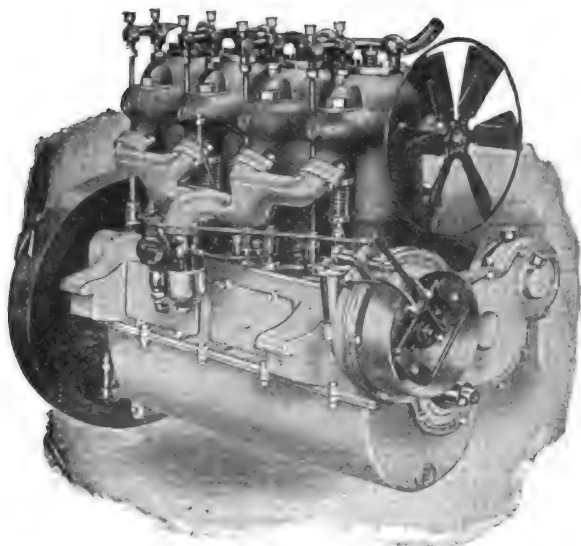
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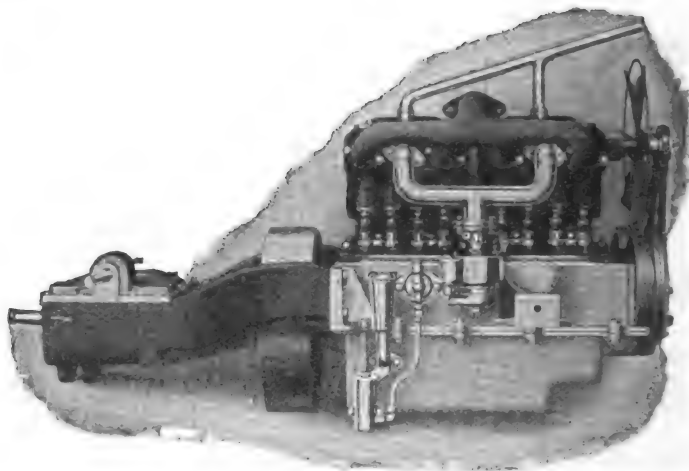
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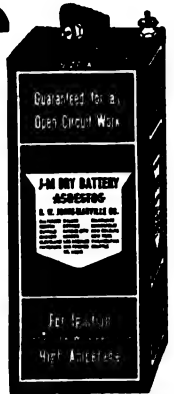
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MULTIBESTOS

"The Brake Lining of Quality."



The Best for Brakes of all Sizes. Does not burn or glaze. Grips, holds, is durable and satisfactory, profitable and economical. Stands up under all conditions. The lining you need!

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Standard Woven Fabric Company Factory, Worcester, Mass.

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G. J. G. "Junior"



The G. J. G. "JUNIOR" is a racy-looking runabout that is GUARANTEED FOR ONE YEAR

ITS 22-26 H. P. gives you plenty of speed, and a reserve for the worst kind of hills and "bad going."

Its equipment includes a Bosch high tension magneto and Dorian quick-detachable re-mountable rims, with an extra rim for 32x3 1/2 inch tires, gas head lights and generator, oil side and tail lights, and many other excellent features.

The G. J. G. "JUNIOR" is the equal of the average car selling for 25 per cent. more than it does. Compare it with any car selling for \$1,250 to \$1,500. You will find that the G. J. G. "JUNIOR," that costs you only \$1,000 with full equipment, is the superior.

Write us for literature and agency proposition.

G. J. G. MOTOR CAR CO.
WHITE PLAINS NEW YORK

Please mention the Automobile Dealer and Repairer when writing to advertisers.

UNIVERSAL TIRE PROTECTORS



not only save your tires from the wear and tear of road contact, making new casings last indefinitely and giving renewed life to old casings, but they are superior mud and sand creepers. With your tires equipped with "UNIVERSAL" tire protectors you can go and come when you please regardless of road conditions and be certain of getting back safe and sound. No need for extra tires—no delays or annoyance and expense on account of tire trouble. The saving effected through the use of "UNIVERSAL" tire protectors

will ordinarily more than pay for your gasoline and the general running expense of your car from season to season. They fit any and all makes of tires, and are as easy to install or remove as quick detachable tires. Special offer to users in unoccupied territory.

Write us today for price lists and discounts.

UNIVERSAL REPAIR BOOTS

are made in three types, the Ratchet Anchor, as shown in cut, Armored

Clincher, and Plain or Unarmored Clincher. All types made in 9 in., 12 in., 15 in. and 18 in.

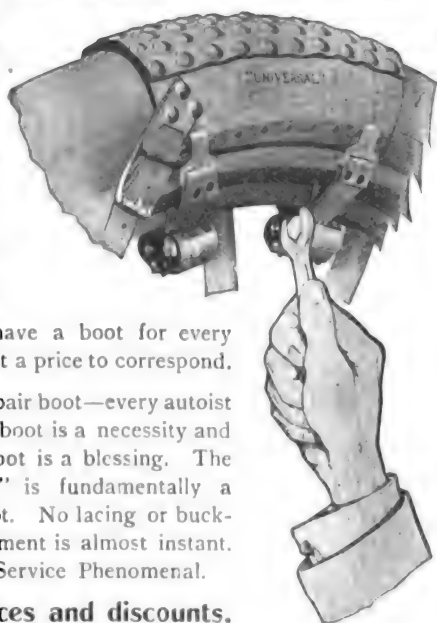
lengths. We have a boot for every emergency and at a price to correspond.

You need a repair boot—every autoist does. A repair boot is a necessity and a quick repair boot is a blessing. The "UNIVERSAL" is fundamentally a quick-repair boot. No lacing or buckling. Its adjustment is almost instant. Cost Nominal. Service Phenomenal.

Write for prices and discounts.

Universal Tire Protector Co.

Lock Box, 678 D
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Quality is the Greatest Safeguard for the Dealer

Only by offering your customer an oil that makes good can you build up a steady, profitable oil trade. Panhard Quality helps you. It forces re-orders—day after day.

Panhard Oil is being advertised in the leading magazines of the United States. Why not benefit by this advertising and sell your share of Panhard Oil?

For the Owner

The cost of an automobile is considerable. Common business sense calls for care in protecting your investment. By using cheap oil you cannot save over \$5 a year. Is it worth the risk?

You cannot **see** the difference between cheap oil and good oil. But there is a difference, else we'd be wasting time and money in producing Panhard.

Look for the checkerboard mark both on cans and barrels.

The Best Oil to Buy



The Easiest Oil to Sell

Panhard Oil is the highest quality which can be produced for automobile use. It is refined exclusively from Pennsylvania Crude Oil and is always uniform quality. It is filtered just enough to give it lightness of color—but not enough to remove its lubricating body. It will not carbonize unless fed too freely.

For the dependable dealer who wants a bigger and better oil business we have a special co-operative plan.

Our booklet "Motor Lubrication" has been prepared for the automobilist who wants to know good oils—and the right grade for any car.

Sent in return for your dealer's name.

GEORGE A. HAWS


67 PINE ST. NEW YORK CITY

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Boston; Chicago; San Francisco; Omaha; Columbus, O.; Minneapolis; Salt Lake City; St. Louis; Shreveport; Los Angeles; Portland, Ore.

Superior Drop-forgings



There's service in the  trade-marked products and you should have it.

This company originated and developed the means for the best possible care of Nut and Cap Screw-moving conditions and in the selection of "Big-Six" set assure you maximum service in least number of wrenches—capacity for all principal bolts and screws from $\frac{1}{4}$ to 1 inch; for every nut and screw about the chassis or engine.

Circular No. 117 is an interesting one to dealers and owners and a postal card will secure it.

See your dealer or communicate directly if must.

J. H. WILLIAMS & CO.

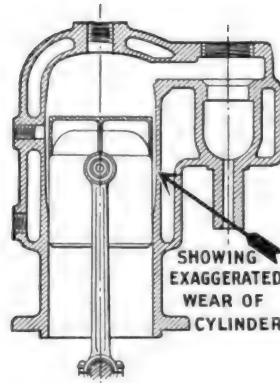
Superior Drop-Forgings

17 RICHARDS ST., BROOKLYN, N. Y.



Stop the Waste of Fuel, Oil and Power

The Underwood Method of Reboring Automobile Cylinders



is the *one* way of securing the accuracy which this work requires.

An automobile cylinder must be round and true.

It takes but a few thousandths of an inch of wear to cause a decided loss of power and compression.

Examine the cylinders in your motor. If they have worn large or have been cut, the best and cheapest remedy is to send them to us.

We are specialists on cylinder reboring—it has been our business for over forty years. Our process is accomplished by special machines and the highest grade of skilled workmanship.

The utmost precision and accuracy are given to every detail that makes for improvement.

Why continue to drive a motor that lacks the power, speed and silence it originally had?

Our process is not a risk nor an experiment. We have rebored a host of auto cylinders in the past three years and haven't yet injured one. This is indicative of our care and accuracy.

We carefully fit *new* pistons and *new* rings and the result is more power than the old cylinder could possibly develop.

Start your cylinders and one piston (for a sample) in our direction at once.

We guarantee our workmanship.

Yes! do it now.

H. B. Underwood & Co.

Established 1870.

**1019 Hamilton Street,
PHILADELPHIA, PA.**

Revolving Cases.

OUR NEW CASE.



Square Drawers, from $2\frac{1}{4} \times 3\frac{1}{4} \times 4\frac{1}{4}$ to $5\frac{1}{2} \times 5 \times 13\frac{1}{2}$.

No manufacturer, dealer or repairer of Automobiles should be without our Cases. They occupy but a small space and their capacity is very large. The Drawers are locked in the Case so as to prevent their removal. Every Case guaranteed. Made for Screws, Bolts, and other small articles. Made in various sizes.

Catalog sent on application.

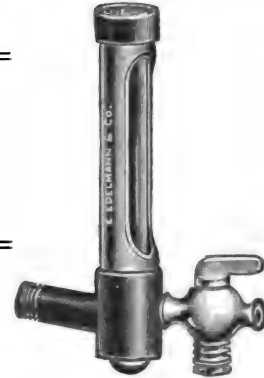
AMERICAN BOLT & SCREW CASE CO.,

Dayton, Ohio.

FORD OWNERS

Have you an Oil Gauge on your Crank Case?
If not—Get one to-day.

This Gauge will indicate the exact level of the oil in your Crank Case!



No. 42 Ford Oil Gauge

Takes the place of lower Pet-Cock on Crank Case. Saves its cost in Oil every month.

YOU KNOW WHAT IT IS.

This ad. requires no further explanation. Send \$1.00 for one today. Your money back if not satisfactory. We also want to hear from the Dealers.

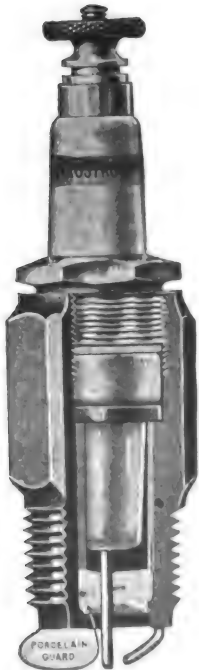
E. EDELMANN & CO.

229 W. Illinois Street

CHICAGO, ILL.

Largest Manufacturers of Automobile Gauges in the World.

The Hagstrom Porcelain Guard Spark Plug



is guaranteed the equal of any plug at any price.

Try it on a FORD and see for yourself.

That porcelain guard feature alone is worth what the plug costs you.

NOW \$1.00

Write for 1912 price list of Hagstrom Blowout Patches, Spark Plugs, Inner Liners and Priming Cups, and the name of dealers who sell them.

THE HAGSTROM BROS. MFG. CO.

Lindsborg, Kansas

LOWE MOTOR SUPPLIES CO., New York City Distributors

You Can't Pull Off This Hose Connection

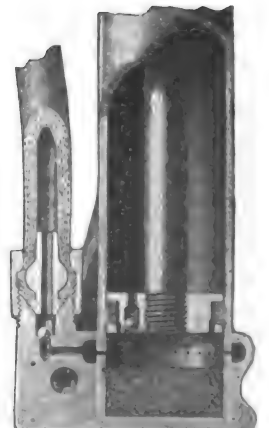
You absolutely can't. Try it and see. The 4-ply hose is fastened to stay. Yet you can put it on and take it off by hand. That's a worth while feature of the

Pitner Pump

The other end of the hose connects to the tire valve in an instant. This is a slip-over connection—no thumbing a burr around. Just jam it on. And there is no leaking of air, either.

These are two of the exclusive Pitner features. The Pitner Pump is built for service. The handle can't come loose. Piston won't leak air. No lost motion in pumping.

Tell your dealer you want a Pitner Pump, or send us \$5 for Pitner, sent prepaid. *Guaranteed* for 5 years' hard use. Your money back if you want it.



Pitner Pump Co.,
1214 S. Michigan Ave.
Chicago.

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KEEP DOWN UPKEEP MEN-DO

DOES IT EVERY TIME.



No heat required, only a pair of willing hands and a Men-Do outfit.

It repairs Inner Tubes, Outer Casings, Horn Bulbs, etc. It has been actually proven that Men-Do will save from 50% to 90% tire and tube upkeep.

All dealers or direct from us, charges prepaid, on receipt of \$1.00.

LIBERTY RUBBER CO.
ORANGE, N. J.

All You Need

to make your
car look like
new—is

MOBO



Mobo is easily applied—with water and a sponge. But that isn't the main point.

Mobo is the only auto cleanser that *takes off the dirt and doesn't ruin the gloss*. Ordinary soap dulls the highly polished "finish," streaks the surface and is liable to crack and blister the paint. When you clean with Mobo you take no chances.

You can *clean your car daily*—Mobo will remove all the dirt and grease, but the surface will look the same as when the machine came from the factory.



*is good for paint and
varnish—gives life and
lustre to them.*

JOHN T. STANLEY,

Maker of Fine Soaps,

644 W. 30th St., New York City.

Write for Booklet "How to Keep an Automobile Clean and Bright," sending us your Dealer's Name.

*Sold in small and large
cans, in half barrels
and barrels, by auto
supply dealers.*

A NEW TIRE FOR \$1.25



**"It's Tough and Elastic"
and "Stays Put"**

Repairs punctures in tubes.
" casings where the carcass is exposed.
" cuts in casings
" sand pockets.
" blowouts.

For the Cement-Doh Outfit contains one large Blowout Patch, 1 can Doh, 1 can of M. & M. Cement, emery cloth for cleaning, brushes and complete directions.

Repairs will be permanent and you can do it quicker and better than vulcanizing. No heat required—no possible chance of burning your tube or casing.

Ask any Tire Manufacturer if the Cement-Doh process isn't recommended by them.

COMPLETE OUTFIT, \$1.25

Not \$2.00 nor \$2.50.

Sold by all dealers and jobbers or sent direct express prepaid.

THE M. & M. MFG. CO., Akron, Ohio.

Manufacturers of that famous M. & M. Cement—all goods sold on the money back plan.

A POSTAL WILL BRING OUR NEW CATALOGUE.

By looking over your tires once a week and filling up those curb cuts which are left unprotected so that sand—and water—cannot work through the opening, loosen the tread and rot the fabric—causing blowouts.

Cement Doh prevents all this, and saves the cost of a new tire.

Cement Doh makes all kinds of repairs, such as:

HERE IT IS!

**It's just the Screw Plate everyone has
been waiting for.**

Contents:

- 1 Plate Stock 11" long.
- 1 each, Screw Adjustable Dies 1/4x28, 3/8x24, 1/2x20.
- 1 each, Plug Hand Taps 1/4x28, 3/8x24, 1/2x20.
- 1 each, Spark Plug Taps 1/2" Pipe and 7/8x18 A. L. A. M.
- 1 Adjustable Tap Wrench, No. 1.
- 1 1/2" Cold Chisel.
- 1 Center Punch.

All for \$6.50, Net.

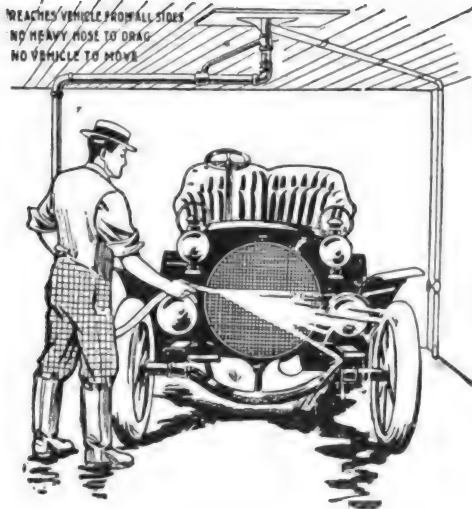
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Derby Line, Vt.—and—Rock Island, Que.

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The Western Buggy Washer



IN OPERATION

It saves time, labor and money. It keeps the hose off the floor.
It drains both ways. It is made of malleable and wrought iron.
It is sold on honor and guaranteed.

THEREFORE, your hose keeps dry and never wears out. No kinks.
No freezing. No breaks. Works easily and smoothly.

SPECIAL SALE Price \$8.00

We will ship you one of our Overhead Washers on 30 days trial, if not satisfactory to be returned at our expense.
Manufactured under our own patents and guaranteed by us.

The Western Robe Mills

24-26 PECK COURT

CHICAGO, ILL.

OUR MODELS 1912 Latest Improved Protector and Tread



Absolutely the final
Solution of Tire
Trouble. No Skidding,
no Punctures, no
Blowouts.

**GUARANTEED THEY
ARE THE BEST.**

**Ask the man who's
tried them.**

We have a **SPECIAL
OFFER** to make on our
Latest Improved Protec-
tor and Tread. We want
a chance to show you we
can eliminate your Tire
Troubles 5,000 miles at a
much less cost than Rub-
ber casings.

**Write for Booklet "Tire
Sense" and Special Offer,**
before spending more
money on your Tires.

Live Agents Wanted.

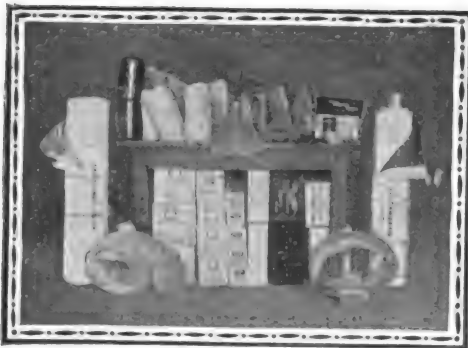
20th Century Tire Protector Co.

Main office and factory, MIDLOTHIAN, TEXAS

Dallas Office, Pacific & Olive Streets, Dallas, Texas

VOORHEES "IDEAL" AUTOMOBILE RUBBER SPECIALTIES

**TO SAVE EXPENSE AND
AVOID TIRE TROUBLES**



VOORHEES RUBBER MFG. CO.

MAIN OFFICE AND FACTORY

18 to 46 BOSTWICK AVE., JERSEY CITY, N. J.

NEW YORK STORE
38 VESEY ST.

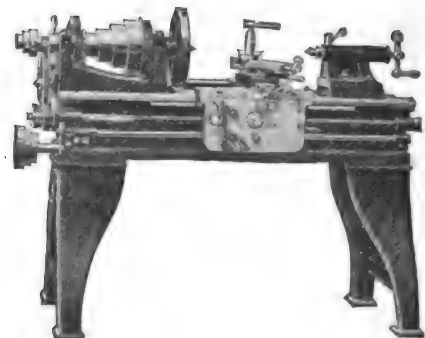
BOSTON STORE
280 COLUMBUS AVE.

MANUFACTURERS OF

Automobile Accessories, Repair Stocks, Etc.

Ask nearest dealer or write to us direct.

SEBASTIAN 15-INCH LATHE



*The LOW-PRICE, PERFECT-QUALITY lathe for
the GARAGE and GENERAL REPAIR SHOP.*

If you are in the market for a lathe be sure and
investigate the merits of the SEBASTIAN.

CATALOG mailed free on request

THE SEBASTIAN LATHE CO.

108-110 Culvert Street,

Cincinnati, Ohio

HORSEY

THAT'S THE NAME

ONE
MINUTE
REPAIR



USE
GASOLINE
ONLY

No Cement No Acid
Inner Tube Patch

One trial of Horsey No Cement Patches and you will consign Cement and Acid Repair methods to the scrap heap and be dollars ahead by doing it.

Large Kit, box contains 12 assorted (large and small) patches, **\$1.00**.

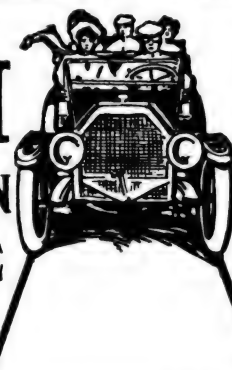
Small Kit, box contains 8 assorted (small) patches, **50 cents**.

Manufactured exclusively by

The Horsey Manufacturing Co.

5606 Euclid Ave., Cleveland, O.

**J-M
NON-BURN
BRAKE
LINING**



The
Best
Auto
Insurance

An automobile insurance policy will not save your life or your car. What satisfaction is the insurance money after your relatives and friends have been maimed or killed?

The best automobile insurance is J-M NON-BURN BRAKE LINING. A small strip of this lining, applied to the inner surface of brakes, will lock the wheels almost instantly when necessary, and prevent many serious accidents. Proved by actual tests far superior to any other brake lining. Used by most motor car manufacturers.

Made of pure Asbestos interwoven with strong brass wires, J-M NON-BURN LINING can never burn, char or unravel, and will last practically as long as the car. It has a bull-dog grip that cannot slip.

Look for the name stamped on lining.

Write nearest branch for sample and booklet,
and our special dealers' proposition.

H. W. JOHNS-MANVILLE CO.

Baltimore
Boston
Buffalo
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Cleveland

Dallas
Detroit
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Los Angeles

Milwaukee
Minneapolis
New Orleans
New York
Omaha

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Pittsburgh
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St. Louis (1405)

AUTOMOBILE TIRES

We are the largest dealers in the world.

Write for our "Price Wrecker," quoting guaranteed and unguaranteed tires.

We have a special dealers' proposition and an offer for agents.

Popular, well-known makes as follows:

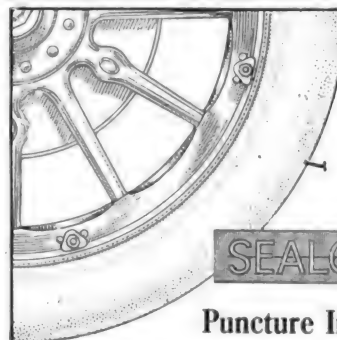
28x3	\$5.00	31x4	\$11.25
30x3	5.50	32x4	11.50
30x3 1/2	8.00	33x4	11.75
32x3 1/2	8.50	34x4	12.25
34x3 1/2	9.00	36x4	12.50
36x3 1/2	9.50	34x4 1/2	12.75
30x4	10.75	36x4 1/2	13.25

Tubes, Windshields, Lamps, etc., all at Jobbers' prices.

TIMES SQUARE AUTO CO.,

1708-1718 Broadway, New York City.

Also { 1332-4 Michigan Avenue, Chicago, Ill.
1820 Grand Avenue, Kansas City, Mo.



**PICK UP
A NAIL?**

Just pull it out and
ride ahead, if your
tires have

SEALO TREATMENT

Puncture Insurance at 1/3c per Day

Squirt a can of **SEALO** into each tire—you can do it yourself—everybody's doing it—then you can forget all puncture troubles forever. Yes, that's **true**; and, better yet, it's **guaranteed in writing** with a

MONEY-BACK GUARANTEE

A written contract is given with every **SEALO** treatment that your puncture troubles and expense are over, or your money back any time within a year! **SEALO** is guaranteed to give **perfect service** and will perform its full functions as long as the tube lasts! **SEALO** is beneficial to rubber—keeps your tube "alive."

Send Now for **SEALO** Tire Book—IT'S FREE!

Tells all about how **you** can get your full money's worth out of your tires—no matter what make. The information in this book is worth many dollars to you. Tells how **SEALO** works, what it is. Contains copy of our Money-Back Guarantee.

Splendid Proposition for Dealers!

Sealo Tire Company

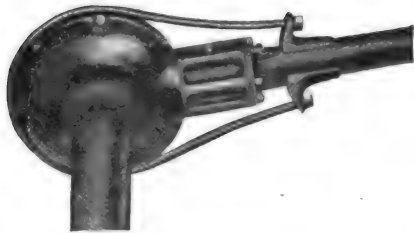
1409 Michigan Avenue
Dept. J20 CHICAGO, ILL.

NAME ADDRESS
Please send FREE with
our order for your
SEALO TIRE
BOOK.

SEALO TIRE COMPANY, CHICAGO
Dept. J20 1409 Michigan Avenue

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The Gardner Patented Rear Axle Truss



**WILL STRENGTHEN YOUR FORD
"T" REAR AXLE 500 PER CENT**

Stops that chattering and vibration.
Keeps the grease in and the dirt out.
Can be installed on car in three minutes.
Short truss for 1910 cars with babbitt bearings.

Long truss for 1911 cars with roller bearings.

Special long truss for 1912 cars.

All sizes for \$3.00 each
F. O. B. Chicago

Write for scheme for getting pistons out of
FORD engine without taking engine from car

GARDNER ENGINE STARTER CO.
1451-1453-1455 Michigan Avenue
Chicago, Ill.

**EVERYBODY PLUGS FOR IT
BECAUSE IT PLUGS
FOR EVERYBODY.**

Stops a radiator leak in
fifteen minutes.

Finds it and
fixes it.

SE-MENT-OL
"CHEMICALLY CORRECT"

Keep
a can in
your car.

Won't injure metal
or clog passages
in radiator or pump.

Always good. Best NOW.

Price 75 cents Ask your dealer or us

The Northwestern Chemical Co.
Marietta, Ohio.

ENDURA SHEET PACKING

As the sign-board guides you to
your destination, so **Endura Sheet
Packing** marks the way to satisfac-
tion in packing for all oil and water
joints.

Satisfaction means durability, econ-
omy and other attributes, which lead
to the peace of mind of the owner of
a car, and to that of the mechanician.

Use **ENDURA** for all of your
gaskets, except on the ignition side of
your engine.

Testing Samples Free.

ENDURA MANUFACTURING CO.
PHILADELPHIA, PA.

ONCE REX—ALWAYS REX



No Garage Complete Without **THE REX TRIPLETS.**

REX METAL CREAM

For polishing lamps, radiators, tanks, etc. Reproduces the original
lustre—not merely a "white shine." Does not settle solid, and will
polish twice the surface of any other brand.

REX WOOD OIL

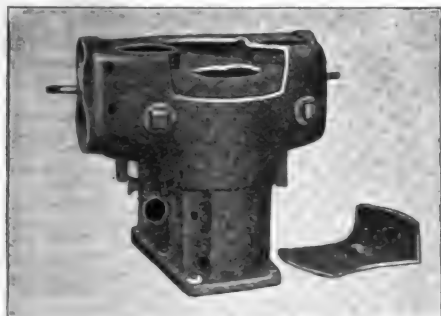
For cleaning and polishing automobile bodies, hoods and cushions.
Produces a high lustre and guaranteed to contain no acids, alkali-
lies or other injurious chemicals. Will not collect dust.

REX LEATHER DRESSING

For refinishing cushions, leather, mohair and pantasote tops on
automobiles, carriages and buggies. Imparts a black durable
waterproof finish. Will not crack or blister and is not affected in
any way by rain or sun. Dries in 10 minutes.

A sample order will convince you.
May we send one?

Armiger Chemical Co.,
2150-52 Austin Ave., Chicago, Ill.



Broken Auto Parts Repaired

Illustration shows cylinder repaired for Consolidated Motor Co., of Bridgeport, Conn. New cylinder would have cost \$45.00; our repair charge was \$15.00. Repaired cylinder was as strong and serviceable as when new.

We specialize on repairing scored bores. We do not enlarge the diameter. When only one cylinder is scored, all four need not be repaired. We leave the motor in perfect balance.

No Charge Unless Satisfied.

If within one year after date of repair, part is found unsatisfactory, ship to us (by freight, collect). Money refunded upon inspection of part.

Write for full particulars about repairs on Axle Housings, Broken Cylinders, Aluminum or Cast Iron Crank and Transmission Cases, etc.

WATERBURY WELDING CO.,

1148C South Main Street

WATERBURY, CONN.

Light Your Motor Car On The "BERDON" Full-Pleasure Plan

Just turn the switch to turn your lights on or off—and so shift all lighting responsibility to this perfect apparatus. It takes care of everything—works without being watched.

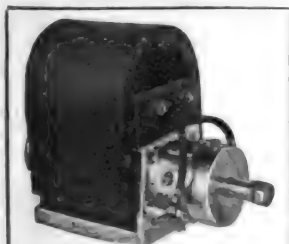
Under the "Berdon" Plan Your Car Lighting Never Wavers; it is always at full strength. Because the generator works automatically at any engine speed and the automatic control checks the variations

so closely that the current is always uniformly supplied—the light is always at full strength. The light never changes according to speed when the "Berdon" Electric Lighting System is used on a car. Here's economy, comfort, safety and absolute satisfaction proved by a **Guarantee of Satisfactory Service for the Life of a Car.**

Accept it at once. Users get more pleasure. Manufacturers add a big selling advantage to their cars. Dealers increase their field for business tremendously. Send for our new booklet—"The Acid Test"—a little story telling of an unusual demonstration made with a "Berdon" System at the Chicago Auto Show.

THE ESTERLINE COMPANY

112 Main Street
LAFAYETTE INDIANA



Esterline generator, guaranteed to give full lighting efficiency for the life of a car.

AUTOLINE

TRADE MARK

The Automobile Lubricant that makes for Efficiency in Motoring. Eighty years Oil Making assures it excellence. You can purchase it at most good supply shops—garages—at any of our 14 branches or direct.

Write To-day for the booklet "For your Motor's sake"

WM. C. ROBINSON & SON CO.
1509-1515 THAMES ST.
BALTIMORE, - - - MD.

"Well! Well!" he says "That's a Cinch—"

"I never imagined that a person could jack up a car so easily—no stooping either. I believe the 10 year youngster can do it. If that \$6.50 saves \$65.00 on tires in a season—it's the wisest investment I've made."

He needn't fear—they'll save him all of that. Many a man has ruefully gazed at his high-priced tires—weak as putty in spots—and wondered why the rest of the tire was strong and resilient and those particular spots getting "cheesy"—breaking down.

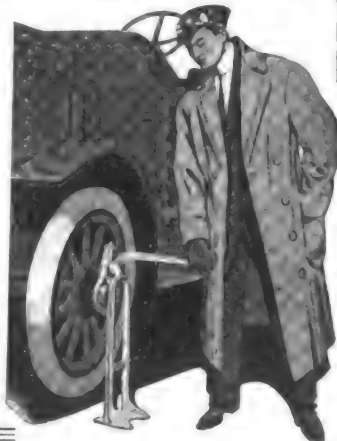
Moore Tire-Saving Jacks

would have saved the expense of new tires or vulcanizing, and cut out all worry. It was the weight of the car pressing the tires against a greasy, rubber-destroying floor, that made them flabby.

An 80-lb. girl or boy can jack up any car in 30 seconds. Easy to apply: slip loop over hub—push down—it's all over.

Mr. Dealer. Stock these Jacks. Good profit. Easily demonstrated. Make friends—because they're "Moore quality." Send for booklet that gives all the easily explained selling points of these and our seven Auto Jacks.

J. C. Moore & Co.
306 Wisconsin St. Racine, Wis.



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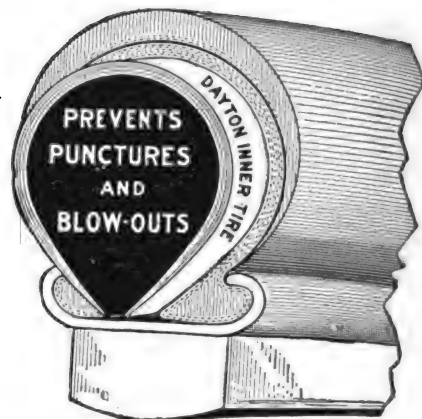
Make Your Auto-
Top Look Like New—Use
Felton-Sibley "EVERNEW"
AUTO-TOP DRESSING

IT'S the best way to brighten it. Easily applied with ordinary paint brush in a few minutes. Water-proof, weather-proof, dries quickly, will not crack, can't injure the finest top. A fine-appearing, new-looking auto-top adds wonderfully to any car—"EVERNEW" Auto-Top Dressing will keep yours that way all the time. Comes in 8 standard colors—special shades to order. Send for color card and prices.

FELTON, SIBLEY & CO., Inc.
Mrs. Colors, Palats, Varnishes
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"Evernew" Auto-Top Sizing for first coat on mohair, cloth or canvas tops that have never been painted.
"Evernew" Auto-Body Enamel in colors to correspond with "Evernew" Auto-Top Dressing.

TIRE TROUBLE STOPPED



Wear the tread completely off your tires by using the

Dayton Inner Tires

ABSOLUTELY prevents BLOW-OUTS and 90% of PUNCTURES.

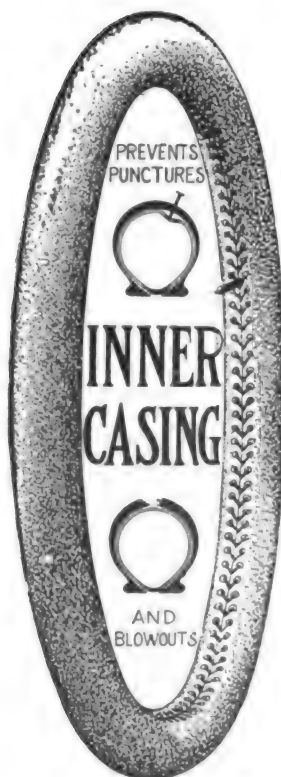
Prevents tube pinches from fabric breaks.

Easily inserted and can be changed from OLD to NEW casings.

Write (Right now) for Descriptive Catalog.
AGENTS WANTED.

Dayton Inner Tire & Mfg. Co.,
DAYTON, OHIO, 19 Madison.

HOW TO PREVENT TIRE TROUBLES



Is very clearly and fully explained in our little booklet

"THE CARE AND WEAR OF TIRES."

If you own an automobile, you cannot afford to be without it, as it will help you to

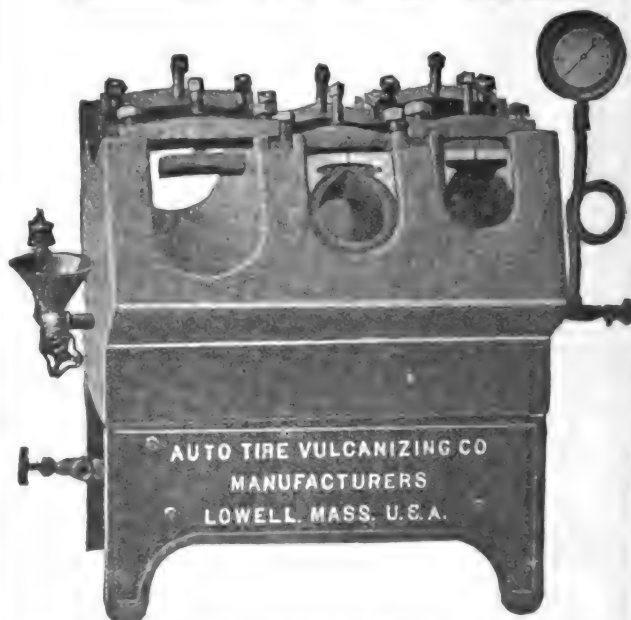
REDUCE TIRE EXPENSE 50% to 75%.

It tells you how to make new tires last 10,000 miles and over. It explains how to wear out your tires without the great annoyance of blowouts, and how to keep your tires in proper repair.

We will send a limited number of these valuable little booklets FREE, postage paid, on request.

**WESTERN AUTOMOBILE
SUPPLY CO.,**
3900 Sheridan Road
CHICAGO, ILL.

Our New No. 8 Adjustable Sectional Vulcanizer With Three Cavities



As a Progressive Business Man you should by all means use, handle or recommend our

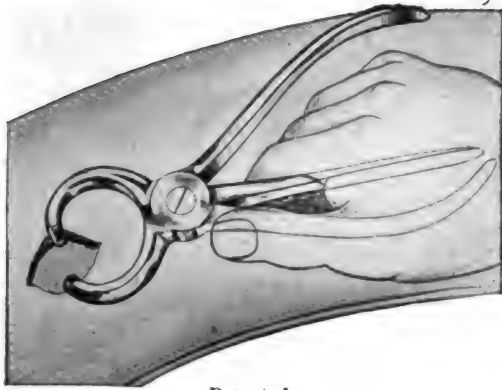
New Improved Auto-Tire VULCANIZING MACHINE

simply and solely because it is the best there is in Vulcanizers at any price and because the price isn't much, the operation is easy and profits are exceptionally large.

Our machine is different, far better and more economical in operation and investment cost than any other made. In all features it is so superior to all other devices there is hardly a comparison. We have some facts that will interest you and that will put you in the way of big profits. In your own interest, get posted—Write to us to-day.

Auto-Tire Vulcanizing Co., Lowell, Mass.

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Patented.

THE AVERAGE COST

of a set of four tires and tubes is \$175.00. The average tire will give under 5000 miles service. They are guaranteed for and adjusted at 3500 miles.

The average cost of tire service is over 3½ cents a mile—5000) \$175.00

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The average tire blows out before the fabric ever touches the road, because of neglect of small cuts in the envelope which let dirt, water and grease in to rot out the fabric. Under perfect conditions a tire should give 10,000 miles service and wear until the fabric gets so thin it will not hold necessary air pressure.

Just insert pliers in cut, open, cement, and put gum next to the fabric. The rubber envelope will hold it against the fabric until it sets and becomes a compact part of the tire itself.

G. WALKER GILMER, Jr., Manufacturer,
50 No. 7th Street, Philadelphia, Pa., U. S. A.

Ask your tire dealer for them, or send me his name and \$1.00, and pliers and cleaner will be sent postpaid. (Small quantity of gum and cement, 25 cents extra.) **Satisfaction Guaranteed.**
Copy of "Cutting Out Tire Expense" sent on request.

"GRIFFITH'S IMPROVED" —AND—

"INDEPENDENT" TIRES

SOLD ABOUT 1/3 OFF

NEW APRIL STANDARD LIST.

Have the good points of all other makes incorporated in them. We sell them to you either guaranteed or unguaranteed.

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Size	Our Unguaranteed	Our Guaranteed	Tubes
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34 x 8½	16.14	19.59	3.46
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THE SAME TIRE

NOTE.—We carry the largest stock of STANDARD MAKES in the United States, and they are usually sold at about 1/2 price.

TUBES

"INDEPENDENT" guaranteed tubes, 30% off.
Q. D. FLAPS, free.

Goods shipped with examination privilege. Money refunded on goods returned intact within a week.

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Fits any type of plug, either foreign or domestic. Turn the threaded fibre sleeve and the jaws are firmly closed and simply cannot work loose.

If the top nut on the plug is lost, the elliptic opening in the brass jaws of the Mac-Kae Universal Terminal will give a secure hold on the thread of the plug electrode.

By fully extending the jaws, this terminal will give secure contact on a plug through the top cap, if by accident the threaded post should be broken off. You can remove the Mac-Kae Universal Terminal while the motor is running.

25c. each at all dealers, or direct from us.

SPARK PLUGS



(Guaranteed)

Deliver a "fat" spark every time without skip or miss. Give a maximum power with minimum fuel consumption. Do not foul or soot.

All sizes \$1.00, Mica or Porcelain.

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MAC-KAE MFG. CO.

Boston, Mass.



Golden Star Auto Body Polish Keeps Your Car Well Groomed

It cleans, polishes and protects the finish.

Does not leave a greasy surface.

Easy and convenient to use.

A few drops of Golden Star Polish used on the dust cloth and your car looks bright, clean and new.

Free Sample

Let us prove (without cost to you) the merits of Golden Star, "The World's Best Cleaner and Polisher." Ask your dealer for a free sample or write us and it will be sent you at once.

DEALERS—Your customers will appreciate good service. Sell them Golden Star Polish. Ask your jobber—he can supply you.

R. W. MORRIS MFG. CO.
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Stryker Muffler Cutout

Patented May 28, 1912.

Clean mufflers utilize from 10 to 50 per cent of the power of your engine—the more you call on your engine for power, the more back pressure it has to overcome—dirty mufflers consume more.

The Stryker Muffler Cutout always relieves 100 per cent of that back pressure—it tells if the engine is working properly—prevents carbon accumulation—and saves oil and gasoline.

The "Stryker" increases your power—it gives the engine snap and ginger—makes it lively and flexible—and gives you the full capacity of your engine.

Write for circular, and give outside diameter of exhaust pipe.

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"TITE-WAD"

GANT TEAR IT OFF

The Rubber Putty.

Repairs Tires—both casings and Inner tubes or anything made of rubber **WITHOUT VULCANIZING**, and at one-tenth the cost.

Biggest Seller for Dealers. Because the greatest time and money saver for owners. **NO TOOLS BUT THE HANDS** required and repairs can not be made better by any method or apparatus.

We Guarantee the User Satisfaction or Money Back.

REPAIR SHOPS

Many of them now use "TITE-WAD" exclusively in repairs. Cost one tenth of vulcanizing, takes less time, results are better, more profit.

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You can now get a motor-buggy which is reliable—light, simple, strong. You can depend on it and sell the horse. Our rigs have solid tires. If you do not need high speed, they are better for every purpose than automobiles. They have perfected 2-cycle, air-cooled engines, and a well-established system of roller drive which eliminates nearly all the moving parts. They are far more economical than anything else can be. They are handsome in appearance, run smoothly, and are very comfortable. They are better made than most automobiles. Prices from \$600 to \$750.

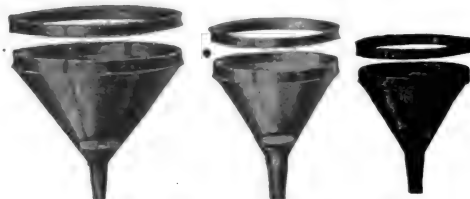
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DOVER AUTO FUNNELS

ARE THE STANDARD

56 Sizes and Styles



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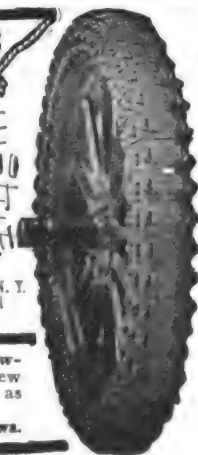
DOVER STAMPING AND MFG. CO. CAMBRIDGE, MASS.

HANG ON TO YOUR OLD TIRES
THEY CAN BE USED FOREVER
WHEN COVERED WITH
STEEL



New York Steel Tire Co.
222 W. 46th St., New York, N. Y.
Agents for New York and New Jersey.

The Kimball Steel Protector makes Blow-outs, Punctures and Rim Cuts impossible. A few sections will hold any old blowout. Tires are as flexible as ever. Send for detailed information.
KIMBALL TIRE CASE CO., 174 Broadway, Council Bluffs, Iowa.



VELVET AUXILIARY SPRINGS



Will make your car ride as soft and easy as a

Velvet Cushion

either with light or heavy loads.

You can attach in a few minutes. They allow no side sway. No machine work or special fittings necessary. **Strong, durable. Cannot twist out of shape.**

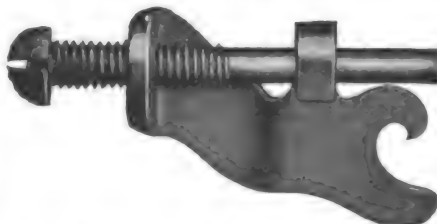
WRITE US—Giving name and weight of car; width of rear springs, and size of spring bolts. Sold for cash, on 15 days' trial.

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EASTERN DISTRIBUTOR,
GEORGE SUMNER, Inc., 1841 Broadway, N. Y. City

Q. D. RIM REMOVER

Saves Time, Labor, Trouble



Hook the tool over the outer edge of tire rim, between the two ends of locking ring. Push valve stem into rim so that locking lug clears inside of Shoe. Screw the bead ring off locking ring. It holds the things apart, leaving both hands free to remove the locking ring. Nickel-

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GUARANTEED to repair cuts in shoes or punctures in tubes without heat or vulcanizing.

Ask your jobber.

SET, \$1.50

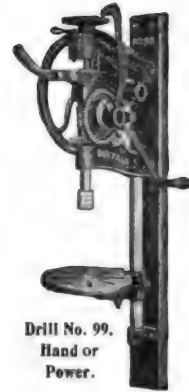
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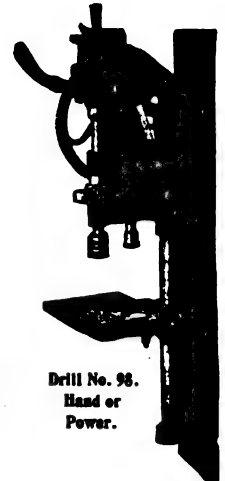
Forge No. 651 E
23x30 inches. Electric
or Hand Blower.



Down Draft Forge
No. 660, Hearth 28x40 in.
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Drill No. 99.
Hand or
Power.



Drill No. 98.
Hand or
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The Forge for your garage—a clean shop and a quick weld.

Among the 40 different forges of our make, we recommend No. 660, shown above, for garages, because it is equipped with our patented "Down Draft Hood," through which smoke and gases are mechanically removed, keeping the shop clean and healthful. It is also fitted with a cinder catcher and with hand or electric blower. It will take the heaviest welds, in the shortest time, with the least effort.

"Buffalo"

The Drill Press for your garage—Ball Bearings; Automatic and Lever Feed "Suregrip" Chuck.

Two styles, very suitable for garages, are shown above. They embody the very latest improved features. Are quiet running, of moderate capacity and very reasonable in price.

Prices and specifications on request. Address Dept. B. T.

Buffalo Forge Co. Buffalo, N.Y.

GRAY'S NEWARK XXX RELINERS

Four to Six Ply—Superfine Tire Fabric—Coated with SELF-CURING CEMENT to Prevent Creeping—Perfect Fitting. GUARANTEED NOT TO BLOW OUT.

28x2.....	\$3.00	36x3.....	\$4.40	36x4.....	\$5.50
30x2.....	3.20	30x4.....	4.80	32x4½.....	5.70
32x2.....	3.40	31x4.....	4.60	34x4½.....	5.90
34x2.....	3.60	32x4.....	4.80	36x4½.....	6.00
36x2½.....	3.80	33x4.....	5.00	38x5.....	7.00
32x3½.....	4.00	34x4.....	5.10	36x5.....	7.40
34x3½.....	4.20	35x4.....	5.30	37x5.....	7.80

MONEY-SAVER

Rubber Putty Outfit

Punctures repaired.....2c
Dig-Outs, Blisters, Cuts, etc., repaired 5c
Guaranteed Equal to Vulcanizing.

COMPLETE OUTFIT, - - 75c

BLOW-OUT PATCHES CEMENTS

VALVE-GRINDING COMPOUNDS PATCHES

TOOL BOXES BUMPERS
LUGS TIRE-CHALK
TIRE-PAINT, ETC.

No. 1

STIK-ON

MOULDED Cementless Patches

As Handy as a Postage Stamp.

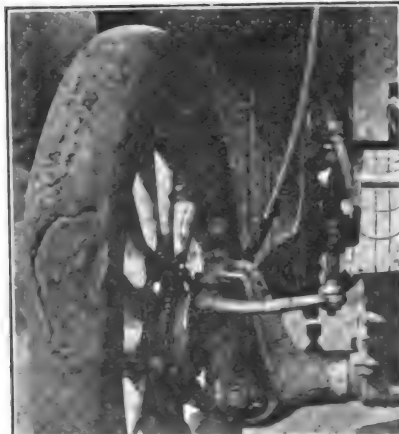
Will Make a Permanent, Heat-Proof Repair.

Gray Rubber60c

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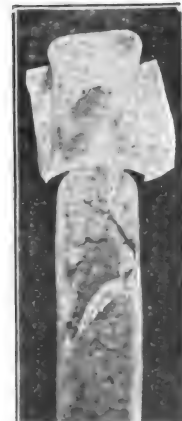
No. 2

Blow-out several inches long (see photo)—shoe repaired with AGRAY PATCH. Result?—500 miles extra service. Then, tire changed, and AGRAY PATCH put back in repair kit for further use.



No. 1 shows
AGRAY PATCH in
use in tire.

No. 2 shows
tire and patch
after 500 miles
extra service.



PRICES

3 in.....	\$0.75
3½ in....	1.00
4 in.....	1.25
4½ in. . .	1.50
5 in.....	1.75

Prepaid
on receipt of
price.

GRAY SPECIALTY CO., 148 Avon Avenue, Newark, N. J.

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**Get in the Swim !
Take an Immunity Bath!!
Be Free from
Spark Plug Troubles!!!**

—USE—

OIL PROOF



SPARK PLUGS

The Only Non-Wire Plugs on the Market.

HERE IS SOME THOUGHT-FOOD

LIVINGSTON, N. J., May 13, 1912.

THE BEST IGNITION EQUIPMENT CO.,
New York.

Several months since I purchased of you a set of "Best" Spark Plugs and they have proven most satisfactory indeed. Previous to this I found it necessary to clean spark plugs once and twice a week. Since using the "Best" I have had no occasion to clean them and believe at last I have found "The Plug."

Yours truly,

(Signed) (Rev.) ALBERT E. PLUE.

This is a sample opinion of more than 35,000 others.

CORRESPONDENCE INVITED IF YOU CANNOT
OBTAIN THEM FROM YOUR DEALER.

THE BEST IGNITION EQUIPMENT CO.

200 West 64th St., New York.

IRVIN SILVERBERG & CO.,

541 Van Ness Ave., San Francisco, Cal.,

Pacific Coast Agents.

Send for Booklet "R," "Spark Plug Information."

Mr. Automobilist!

Your tire maker is very anxious to impress upon you the importance of

TIRES INFLATED TO THE RIGHT PRESSURE.

He insists that this is tire economy and

SAVES YOU MONEY.

How do you know what pressure you have in your tires?

A Schrader Universal

(Trade Mark Registered in U. S. Patent Office)



HALF SIZE.

(Patented March, 1898—Other Patents Pending)

Tire Pressure Gauge

will tell the exact pressure in your tires at any time, day or night, by simply holding this Gauge to your Valve for a second. Its recording sleeve remains in place, showing the exact pressure in the tire, so that the Gauge can be taken anywhere and read at night, to the front of the car into the light of the lamps. After the pressure has been ascertained the Indicating Sleeve can be pushed back into the Gauge with your finger. No catches or snaps to operate or get out of order. This Gauge is 2½ inches long over all, short enough to apply easily to the smallest diameter of wheel, and can easily be carried in the vest pocket or the change pocket of your trousers.

PRICE \$1.00 EACH, Ready for Delivery Now
GUARANTEED SIMPLE AND ABSOLUTELY ACCURATE

Can be obtained from all tire manufacturers
and the dealers, or

A. SCHRADER'S SON, Inc ,
28-32 Rose Street, New York City

ANYONE CAN USE THE BROWN IMPULSE TIRE PUMP



Just take out the most convenient spark plug, screw in pump, attach hose connecting with tire valve and start motor on low speed.

In from one to four minutes your tire is filled—better than you can fill it by hand—with pure fresh air.

Self-opening valve connection and high grade recording gauge make filling tires with the Brown as simple as child's play.

Why not get rid of the most disagreeable features of automobiling?

The Brown sells for \$15.00 at your dealer's or direct from us.

Descriptive literature **FREE.**

THE BROWN COMPANY

1100 S. CLINTON STREET

SYRACUSE, NEW YORK

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Automobile Dealer and Repairer

A JOURNAL OF PRACTICAL MOTORING.

VOL. XIII, No. 4.

NEW YORK, JUNE, 1912.

PRICE { 10c. PER COPY
\$1.00 PER YEAR

THE PROFESSIONAL MAN.

How a Clergyman Uses His Car, Its Cost in Up-Keep and Its Physical and Mental Benefits.

From Rev. Percy Reed Ferris, New York.—The automobile is now recognized by men in all walks of life as a permanent fixture in our national economy. It has made for itself a place that even an airship cannot occupy. As a necessity in business and professional life, or as a means of exhilarating pleasure and soothing recreation it has no equal.

Five years ago, while pastor of the Baptist Church in Amenia, N. Y., I sold my horse and purchased a second-hand car. From the time I mastered my first lessons, which took the best part of a day, I have recommended the automobile as the surest remedy for tired nerves and a means to restore flagging energy.

Often have I said, as with family and friends we traversed the lovely valleys and hills of Dutchess County, that I would rejoice when competition and experience should reduce the price, so that all who have the desire to own an automobile for the pleasure and health it affords, could do so.

Cost Per Year.

Today the automobile is not the expensive luxury of the rich alone. As a preacher my salary has never equaled the expenses of our home. When I kept a horse I averaged \$150 a year for maintenance. During the five years I have owned a car I have kept a strict account of every cent it has cost me and the average cost per year has been \$102.50, which includes the cost of running my second-hand car two years at an average cost of \$177.00.

Having my own garage and driving the car myself enables me to enjoy all the exhilarating pleasure of motoring at a lower cost than I formerly paid for keeping a horse and carriage. It also makes possible my making five times as many calls upon my parishioners as I could previous to my buying an auto, and now I have the pleasure of assisting the ladies of the church whenever they hold a supper or lawn festival. So besides the countless trips with hours of relaxation I now have, at a cost of little more than \$100.00 per year, I can also accomplish more good as a minister of the Gospel in the community I serve.

But the question arises, how can professional men, who seldom have any mechanical training drive and repair an automobile? Is not the complicated machinery of an automobile a bar to ownership by the average professional man?

These questions troubled me before I purchased my first car; for I was conscious that while fascinated with the first automobile I saw, I had been so busy with books from boyhood that I had received no mechanical training. So I could not expect to quickly detect friction of parts, or repair deranged or broken machinery. Remembering my good father had often

said that I had no talent or inclination to make a mechanic, I did not expect to readily make adjustments when I discovered trouble in my engine.

Then my friends and neighbors heard I had the automobile bee buzzing in my ears and they at once prophesied that it would be the mistake of my life to purchase one of those complicated machines. I could appreciate that state of mind more fully when after courageously making the venture and returning from our first long trip, they congratulated me upon getting home alive.

But complicated as the machinery of a gasoline engine seems to be; strange and awe-inspiring as it feels to have so much power in your control, it does not require a trained mechanic to understand or safely drive an auto. Simply good common sense and a determination to master the machine and drive it carefully.

Stupid as I felt myself to be about machinery, by exerting care I was able to run my car the first day I owned it, through narrow streets and by other vehicles without accident; also by careful observation I soon confidently made minor repairs on my motor.

Necessary Lessons.

The first lesson to learn is to guide the car carefully while resisting the desire to speed beyond the safety limit. The next lesson I faced was the repairing of a punctured tire. Applying my mind to the problems, I was soon rejoicing that the tube was on and stayed there. Next in quick succession followed the adjusting of electric fixtures and regulating my oil supply. And when I look back over five years' experience in driving and caring for an automobile, I am amazed that a machine composed of about five thousand parts, each part interdependent, so rarely breaks down or fails of action.

Another lesson I learned was not to expect trouble. For several weeks after I purchased my car I imagined all kinds of difficulties would come, and I expected any minute might find me under my machine making repairs, but when I found my touring car went right along, and the anticipated troubles did not materialize, and I did not climb telegraph poles, or run into any other vehicle, I decided it was time to practice in motoring what I had long preached from the pulpit, that it was sinful to worry over accidents that might never overtake me. From that hour I have seldom been annoyed by discouraging experiences.

Even the widely heralded tire troubles have not been as extensive and burdensome as I was warned they would be. With good care and the judicious use of a little motor sense, an average of two years' service from each tire has been obtained.

Frequently I am asked how I could run an automobile for five years without any previous knowledge of machinery and not have a single accident. My reply has been that I am confident my freedom

from serious accidents is due to a rule I made when I began to motor, that I would never drive recklessly, that fifteen miles an hour would satisfy unless some emergency arose which might require a burst of speed. One result is that my friends are always ready for an invitation to ride in my car in preference to others, simply because they feel safe at the rate of speed our car travels.

Another resolution I am confident has saved us from much trouble, has been a determination to go slow or stop entirely whenever a dangerous situation presents itself. Frequently, all drivers meet on narrow roads, individuals afflicted with the speed mania (motor ataxia), and others who are intoxicated enough to insist on having the whole road. Then we meet chauffeurs whose eyesight is poor, and drivers of other vehicles who are deaf, absent-minded or careless. Then we all frequently meet the driver who seems anxious to see how close to you he can pass without hitting you and those who lose their nerve when suddenly confronted with a situation that requires quick thought and action.

Good Advice.

If an owner is watchful and will be satisfied to travel at moderate speed the scenery can be thoroughly enjoyed while its attractions are discussed with companions. One who will be content to do this will escape accidents, enjoy good health, and will not be under the constant nervous strain made necessary by a high rate of speed. The strenuous life is unnecessary when business is over and the body requires relaxation and rest.

Often while touring through the country I have stopped and examined a fine car wrecked along the road. After seeking to be of assistance one naturally asks how it happened. The answer is usually what has become in motordom the "Old, Old, Story"—i. e., the driver was speeding.

Men of all professions realize now as never before that the automobile not only saves them much valuable time but enables them at the same time to enjoy better health than before they owned a car. They have found they require exercise in the open air, and a complete change after long hours in office or study. And by entering the garage an hour before beginning professional work and going over the car carefully, exercise is obtained and the owner is prepared to undertake his office work with vigor and pleasure. And the thought that the car is all ready for a spin in the bracing air as soon as the regular work is completed makes the usual task a pleasure.

Many who have formerly owned horses have realized when meeting an auto on narrow country roads that "a horse is a vain thing for safety." How many of us supposed that an automobile would be still more unsafe, only to learn with surprise and delight that the driver who uses common sense and clings to his safety rules, is safer than formerly. Under many circumstances a horse cannot be controlled, but the faithful auto will obey your slightest touch and will do the right thing if you keep cool enough to direct it.

Nature's Art Gallery.

To a minister of the Gospel the automobile has become indispensable. With it he saves time while doing a large amount of good by the increased number of visits he can make among his people. And while covering the distance between calls he may find more recreation in one hour than otherwise he might in a whole afternoon. Tired as one may be

by his morning work in the study, and by bearing on his mind and heart the weight of his peoples' sorrows and sufferings, all may be forgotten as he rides through the beautiful landscapes, over lovely hills and mountains until his heart thrills with joy and he is a new creature amid the beauties of God's great world which He has made so attractive. And no stimulant can equal that which a tired man receives when he forgets all care and enjoys an exhilarating ride through some part of God's great Art Gallery.

The restful pleasure found in riding over hill and dale is the best cure known for a tired body and worn-out nerves, and nothing but sleep can better prepare one for the exertions of the morrow. Personally, I have been fully convinced that there is no recreation that so completely prepares one in body and soul and mind, for the tasks that a minister faces every Sunday as a spin on Saturday afternoon.

When the clergyman feels the thrill and joy found in driving his own car, and is conscious he can enjoy short vacations each week which he never enjoyed before he purchased his auto, badly as his body required them, he is heartened for the most arduous tasks, knowing that with added pleasures also comes the enlarging of usefulness. And never could he consider returning to the expensive horse or use the poorly ventilated trolley car.

Just a closing word to the professional man who contemplates buying a car. Be sure and purchase one with an extra seat, in order that you may give some friend or neighbor an invigorating ride. There are many in every community who can never own a car. There are others who have never been in an automobile and who will be happier in your machine than they would be anywhere else in the world. And the expressions when the ride is over, as well as the smile upon the countenance whenever the ride is mentioned, will bring happiness to your own soul and help repay your effort to make another life cheerful.

An earnest prayer is often in my thought, namely that competition will soon further reduce the cost of manufacturing automobiles in order that anyone who can afford to buy and keep a horse may be the happy owner of his own car.

May the automobile, recognized today as one of the greatest and most useful inventions in transportation in the history of the world for the business and professional man, soon be within reach of all who require more than all else, a little freedom from the exacting demands of the daily routine of life.

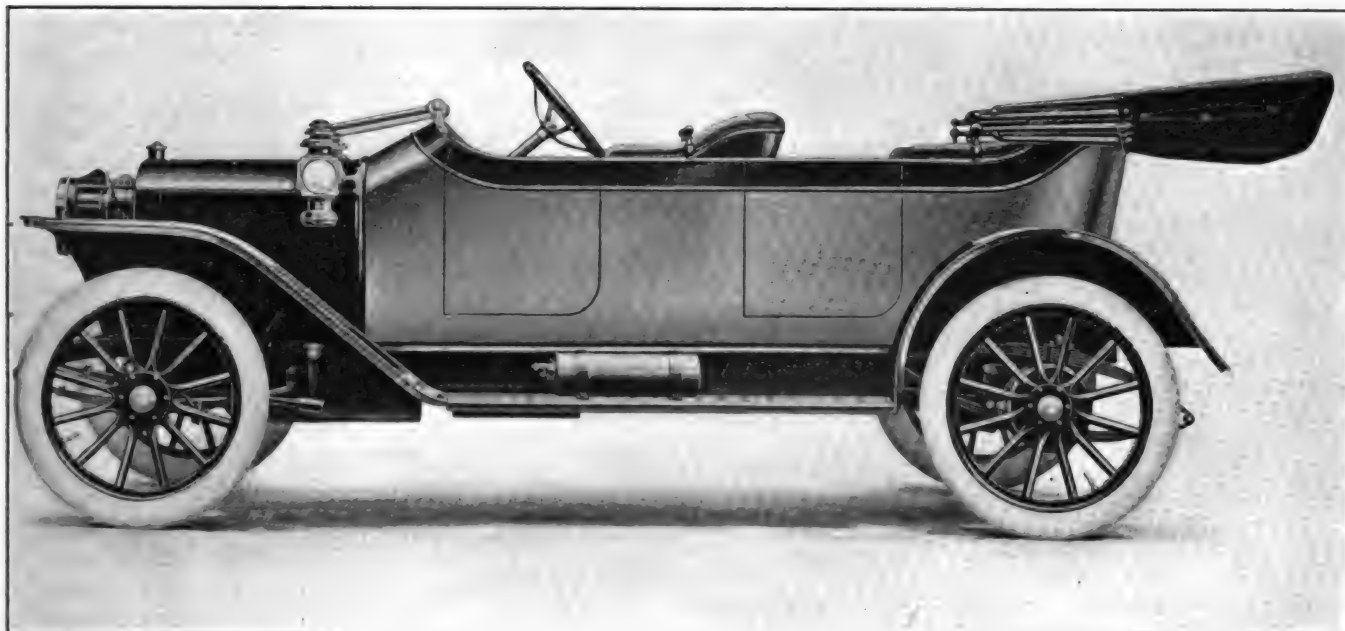
Economy In Tire Use.

From Andrew Werling, Indiana.—I wish to say a few words in addition to the George Kiltz, Ill., article in the May issue on tire treads. I have a Cadillac Model A car. On the front wheels I have solid tires. On the rear wheels, I have single tube tires. If the single tube tire leaks, I cut it open at the tube about eight inches, and put in an inner tube. The inner tube I cut about six inches from the air valve. Then have both ends vulcanized, put it in the single tube tire, lace the cut, wrap it and put on Woodworth treads. This way I have used my single tube tires three years, and had no punctures or blowouts. I use my car as telephone line use, for farm use, and as a touring car, nine months in the year, almost every day on the road. I find it is not good to let the treads creep, so I take boiler wire and tie the treads about every other spoke. This way the pull is all on the tread, and the tire has only to hold the wind.

Low Price But High Grade.

One of the most attractive propositions of the year in relation to automobiles is that made by the R-C-H Corporation of Detroit, Mich. They are now selling for \$850, a fully equipped touring car, up-to-date in every particular, and made of the best material. With a self-starter and equipped as stated below the accompanying illustration, the price has been put at \$950. The firm is a responsible one, and it states that no better car can be built at any price. The reasons they give for being able to make this low price is that they do not waste a dollar of money or an hour of effort in manufacturing. Although they want it understood that they prefer to have their car judged not on the price, but on what the purchaser gets for the price, they naturally feel that these figures could not

Springs—Front, semi-elliptic; rear, full-elliptic.
 Frame—Pressed steel channel.
 Horsepower—22.
 Cylinders—4, cast en bloc.
 Bore— $3\frac{1}{4}$ inches.
 Stroke—5 inches.
 Valve Arrangement—Enclosed large, all left side.
 Fuel Supply—Gravity feed.
 Ignition—Bosch magneto.
 Lubrication—Splash feed, constant level.
 Steer—Left side.
 Cooling—Thermo-siphon.
 Radiator—Tubular.
 Motor Suspension—3-point.
 Clutch—Cone.
 Change Gear—Selective; center control.



R. C. H. Touring Car, equipped with self-starter, gas tank, demountable rims, and 1 extra rim, 32x $\frac{1}{2}$ -inch tires, tire irons, Splitdorf dual ignition; f.o.b. Detroit, \$950.

have been accomplished except through the most thorough and up-to-date system of manufacturing.

A little over six months ago the first R-C-H automobile was shipped from the factory. Since then thousands of these cars have been marketed, and still the company is behind in its orders. In addition to this inquiries received from abroad have resulted in the closing of deals for representation in all parts of the globe, until at the present time the R-C-H line is handled in twenty-eight different countries with hundreds of cars in operation.

As to the construction of this car, chrome nickel steel is used throughout all shafts and gears in the transmission and rear axle, and high carbon manganese steel in all parts requiring special stiffness; 123 drop forgings are used, it is claimed a larger number than in any other car in the world, irrespective of price. The R-C-H crank shaft is as large as that in many 40 h.p. cars. The long-stroke motor ($3\frac{1}{4}$ -5) develops exceptional power and speed. The springs—full elliptic rear and semi-elliptic front—insure easy riding. The following are the specifications:

Wheel Base—Roadster, touring roadster and coupé, 86 inches; touring car, 110 inches.

Gauge—56 inches.

Axles—Front, I-beam drop forged; rear, semi-floating type.

Speeds—3 forward and reverse.

Transmission—On rear axle.

Brakes—Two internal; two external.

Brake Control—Two foot pedals.

Standard Equipment—Includes two gas lamps and generator, two side oil lamps, one tail oil lamp, top with side curtains complete and folding glass wind shield, tire pump, tire repair kit, tools, horn and jack.

A Protest from a Stranger.

From Broda Kalka, late of India.—With your permit I would make revelation in your world-wide journal which I left when I read in India, that I now note many indiscretions in your country, since I have not visited before my last time I have not visited until this time. The streets of New York give much danger in crossing, with no courtesy for knocking down by an automobile. I, a stranger, did not look but for street number and was hitten, with abrupt suddenly just below my back. While slowly and with pain and soiled garments I rose my prostrate body the auto car quickly went away. This indignant both my mind and body but no remedy seems possible. Would it not be useful to make this plain in your wide read journal? In India there is more care to give those on foot by the motor cars.

EXCESSIVE PRICES.

Astounding Overcharges for Parts by Car Manufacturers.

From E. H. Van Patten, Washington.—I see quite a discussion going on in your journal concerning the subject of overcharging by automobile manufacturers, and would like to add one word thereto. In the first place, it is not wise to criticize any man before you know his side of the question. The fact remains however, that in some instances overcharging is being done. I found this out by the acknowledgment of the manufacturers themselves.

For ten years I have been driving my own car, and in the earlier days could not obtain any one who was competent to do any repairing whatsoever; therefore I had to make a special study of my car and superintend, or do myself, whatever work was done for me. In that way I soon became familiar with many things which are mysterious to later day owners. In the first place, the automobile and its repair is quite a different thing from that of almost any other kind of machinery. It is built more like a watch, has finer material in its construction, and better workmanship than has any other piece of machinery which falls into the hands of the average man. Adjustments must be made which require more time and patience than is usually given to such matters by users of ordinary machines. The average blacksmith may be able to fix harvesting machinery, but the man who uses it must see to its adjustment for himself. With the automobile this matter of adjustment is too often left to the blacksmith who really knows nothing about it, and dissatisfaction has always attended such methods. His prices may be lower than would be those of the auto manufacturer, but will not be nearly so satisfactory in use. Here is where I conceive that a great deal of this furore comes from. Because the blacksmith works cheaply, and the average driver assists him with what little skill he may possess, in small things the results are good. But when it comes to fitting crank shaft bearings and those parts which need real expert knowledge the results of this combination of blacksmith and driver is not successful. It is wiser to employ first-class workmen even if the prices are higher.

Nevertheless, I am convinced that there is something in this cry of overcharges by many users of cars. For instance I had a magneto fitted to my car this spring, and had to drive it from the cam shaft by sprockets and chain, or by gears. Some of my friends had this change made on their cars, fitting them to drive with gears, and they made so much noise that I decided for the chain. The repair men sent to the factory which made my car for the bracket, sprockets and chain and when I went to pay the bill I was astonished to learn that the sprockets cost as follows:

1 six tooth, 1 inch, for 3-16th roller chain.....	\$2.50
1 cam shaft sprocket, 12 tooth, same width.....	7.00
2 feet of diamond roller chain for same.....	3.00
Fitting extra hub to small sprocket.....	8.25
1 bracket for magneto	6.00

\$26.75

Remember this is for material alone, save for making the extra hub, which was not needed.

I found that the chain sells in the open market for 32 cents per foot, from which there is a retailers' discount of fifty per cent., making the chain cost the manufacturer only 32 cents for the two feet of chain.

If you will count this up you will readily see that the profit to the manufacturer was over eight hundred per cent.

The sprockets are merely bicycle sprockets, and cost at retail about \$1.50 for the two of them, and yet I had to pay \$9.50 for them. This is over 600 per cent. profit to the manufacturer. It does seem that this ought to have been enough, but no, the hub cost over \$8.00 to fit.

I wrote to the manufacturers about this charge telling them what I could have bought them for at retail, and they acknowledged that I could do so, and never gave any reason whatever for the overcharge. Such treatment causes a thinking man to suspect at once that everything in their repair list is overcharged for in like manner, and beside rousing a little resentment, will cause auto drivers to get together and advocate the lowering of the tariff on automobiles and their parts. This movement is gaining force in this section and we are writing directly to our representatives in Congress laying the matter before them. We are perfectly willing to pay a just price with all legitimate interests on investments, but do not like to feel that we are being deliberately gouged out of 600 and 800 per cent., especially when the parts are not kept in stock by them, but bought in the open market.

It is such treatment by automobile manufacturers which is causing this cry of excessive charging, and I wish to add my little experience in support of that cry.

Splitdorf Company Enlargement.

With the incorporation of the Splitdorf Electrical Company, with a paid-in capital of \$3,500,000 and the election of John T. Alvord as President and C. F. Splitdorf as Vice-President of the new concern, the motoring world views a combination of interest to the industry as a whole. The company has been organized as an entirely new organization with a stock issue divided into \$1,500,000 of 7 per cent. cumulative preferred shares and the balance of \$2,000,000 of common, with John T. Alvord acting for the Torrington Company, of Torrington, Conn., the direct sponsor for the new corporation.

The wide interests of C. F. Splitdorf, Inc., of magneto, coil and spark plug fame are absorbed in the new company with the object of enlarging the present huge business. Mr. Alvord brings with him into the new company several men who are closely identified with his vast enterprises. Bryant S. Keefer has been elected treasurer of the Splitdorf Electrical Company, while Carlos W. Curtis is secretary and general manager. John R. Viles, with Messrs. Alvord, Splitdorf, Keefer and Curtis, will complete the board of directors.

No radical changes will be made for the present in the business which "Charlie" Splitdorf has made so famous in every section of the country and with which he retains his interests and continues his inventive and selling activities. Facilities for increasing the present huge output of magnetos, coils and plugs are being studied by the new company.

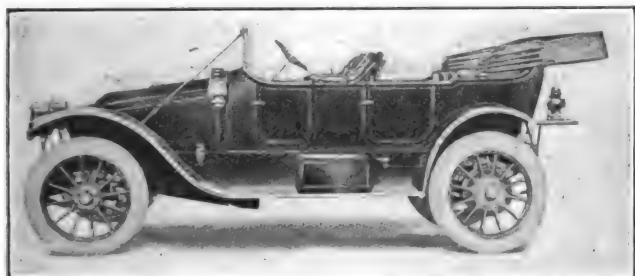
A Practical Grade Crossing Suggestion.

From A. T. Thorson, Washington, D. C.—May I presume to offer a suggestion? In driving after dark, in unfamiliar territory, I have been much worried by railroad crossings. Frequently—I might almost say, usually—the highway crosses the tracks at an angle, that is, diagonally instead of at right angles, with a sharp rise directly at the crossing. In the daytime this is not

of much importance, but at night when a cautious driver is proceeding slowly, the sudden turn and steep grade, seen at the last moment, added to the natural anxiety associated with grade crossings, is apt to become a serious matter. Could not the automobile press agitate for wider crossings, an easier approaching grade carried back say 25 to 50 feet from the tracks, and even a suitable light?

The Franklin Air-Cooled Car.

Color—Royal blue.
Seating Capacity—Five persons.
Clutch—Multiple disc.
Wheel Base—123 inches.
Gauge—56 inches.
Tire Dimensions—Front, 36x4½ inches; rear, 37x5 inches.
Brake Systems—Contracting on propeller shaft and both rear wheels.



Franklin Five-passenger Touring Car, Price \$3500.

Horsepower—(A. L. A. M. rating) 38.4.
Cylinders—Six.
Arranged—Vertically, under hood.
Cast—Separately.
Bore—4 inches.
Stroke—4 inches.
Cooling—Air.
Ignition—Jump spark.
Electric Source—High tension magneto and storage battery.
Drive—Shaft.
Transmission—Selective sliding gear.
Gear Changes—Three forward, one reverse.

Heating of a Motor Car Engine.

A good many troubles arise from most simple causes, the difficulty being to find out exactly what is the matter. Repeated trouble was experienced in connection with a high-powered motor car, owing to the fact that the engine did not appear to be able to stand up to the work which was required from it, more especially when it had been running for some little time. This was due to the fact that it had got overheated and the matter appeared to be inexplicable, inasmuch as the water cooling system was clean and thoroughly free from leaks. Suspicion then fell upon the fan which was used in connection with the cooling system, but on running the engine slow in order to observe the fan, it was found that it was running quite well. Nevertheless it was ultimately found that the trouble was entirely due to the fact that at high speeds when the engine was running fast the fan did not work owing to the fact that the fan belt was greasy and a bit slack. At high speeds, therefore, it did not act as it should do, although at low speeds the grip was sufficient to run the fan

round. Most fan belts are adjusted by a spring bracket or some special design and this also must be kept reasonably tight and free from grease or oil.

It is an extremely difficult job in connection with this fan belt to keep the oil away from the belt, as the belt is usually driven from a pulley on the crank shaft which is more or less closely adjacent to one of the crank shaft bearings. The oil works along from this bearing and is thrown on to the pulley. This in turn conveys it on to the belt and so causes slipping. It is probable that this simple cause is at the root of a good many complaints regarding inadequacy of motor car engines to do their work. One way to prevent the oil from creeping along is to fit a piece of sheet metal on to the shaft between the pulley and the bearing so as to form a disc which will rotate with the shaft and which will form a throw-off ring for any oil which gets past the bearing, before it reaches the pulley for the fan belt. It will be found that this small addition to the motor car equipment will oftentimes go a long way to curing this particular trouble.

DRIVING EXPERIENCE.

Two Cases of Going Wrong and What Caused the Trouble.

Drivers of even the best known makes of cars have occasionally experiences in connection with their work which are worth putting down for the benefit of other men engaged in the same line, and for this reason the writer wishes to refer to two experiences which each have their points of interest. The first of these occurred when out on a wet day with a well-known make of car. There was a considerable amount of trouble with the carburetor which in this car is placed very near the ground so as to bring the hot air pipe into contact with the exhaust pipe. After running for about five miles the engine suddenly stopped and after getting out, examination showed that the needle was stuck down and would not let any gasoline through. Hence the engine had failed from want of gasoline. The carburetor was then given a sharp twist and it was lifted, and as soon as it was full and flooded, the engine started up without any trouble.

On the next occasion when the carburetor stuck the car was on a hill and as the driver was in a hurry he did not want to stop the car altogether. In this case there was a variation, for the carburetor stuck up and consequently the engine was getting too much instead of too little gasoline. The driving wheel was handed to some one else in the car and by getting out on to the running board the driver could get at the needle. In this way the trouble was temporarily got over. The next morning, however, on cleaning out the carburetor it was found that a good deal of grit and water had found their way into it and it was evident that this was due to the fact that the water and mud had been picked up by the carburetor owing to its being placed so near the ground, the mud being splashed up on to it. In order to get over this a small shield was made out of sheet metal and fixed over the top of the carburetor and this shield proved perfectly efficient in getting over this difficulty.

Another incident which also shows the necessity for careful attention to detail on a car was as follows: One day on trying to start up the car, the driver found that it would not get away at all. The plugs, carburetor, and the gear were carefully examined, but

nothing appeared to be particularly wrong. A splendid spark was obtainable, but on trying to start up it was found that the engine would only fire two or three times and then stop. This suggested that there might be something wrong with the firing circuit, so the wires were carefully examined to see if one of them had become chafed by coming into contact with the frame. If this defect in the circuit had occurred and so worn off the insulation, misfiring would most certainly have been caused, but in this case the wires appeared to be in good order. Somehow or other the ground wire was overlooked, and it was not until the footboards were being fitted that it was noticed that an end of the wire dangled about and was not in its proper place. This was found to be the ground wire which should have been connected up under one of the nuts of the gear box cover. On inquiry it was found that someone had the day before taken the cover off when greasing the car and had forgotten to fix the ground wire in its place again. When the ground wire was connected up properly the car started and ran beautifully, and the reason why the engine would only fire spasmodically was found to be that when the wire was hanging loose it would touch the frame occasionally and so ground the firing circuit, but as soon as the vibration caused by the rotating engine shook the car the ground wire shook away from this touch contact and so misfiring was caused.

There is nothing so very wonderful about either of the above instances from a technical point of view, but they are useful in demonstrating the fact that care in watching details is necessary for the operation of even a first-class car, whether large or small. Possibly other men have not come across the same experiences as the above and they may therefore care to add them to their stock of practical notes.

Cost of Upkeep.

From E. C. Dickerson, New Jersey.—At times your magazine prints articles that look unfair to me, and one of those appears in the May issue, page 46, wherein you state a car can be driven 1,000 to 1,700 miles per month on an upkeep of \$31.50 in the country, and \$45.25 in the city. Will you please explain to me how this can be done? According to my way of figuring the figures you mention will not pay for the tire upkeep alone. As an illustration we will take the 50 h.p. car and give you the benefit of moderate size tires and figure on shoes only, no tubes. Say you have 34x4 on your front wheels and 34x4½ on your rear wheels—all tires guaranteed 3,500 miles (plain tread).

List on former size \$38.00 each $\times 2 =$ \$76.00

List on latter size 48.10 each $\times 2 =$ 96.20

\$172.20

Divide \$172.20 by 3,500 and if you do not get four and nine-hundredths cents for each mile I certainly am short on arithmetic. This would make \$40.90 for each thousand miles, supposing you got your mileage adjusted honestly which is largely a matter of guess work and in any case the buyer is compelled to take whatever the tire maker gives him.

I have driven a car for some seven years and I have kept records until I became so disgusted with the expense, had it not been for my family, I would at times have given the car away almost, and I have always heard from those interested in the sale of cars and equipment how cheaply they could be bought and kept. One maker offers prizes for the low upkeep

of a car and does not figure the cost of a chauffeur in the upkeep, though for every car where it is taken as the basis of the upkeep a chauffeur is employed and does what repairing is necessary (though no repairing shows in calculations). On the same principle as a man going in business and calling his gross receipts profits. A great many buyers of automobiles go in with the idea that an automobile can be kept as cheaply as a horse and are disappointed when they find they are mistaken. I heard one man say his first year cost him 15c. per mile, his second 40c. per mile and his third year 75c. per mile, the cost increasing as his car got older and my experience would verify his statement.

If you will find someone to explain to me how to run a car on such figures as some people put out, I would certainly appreciate it. I know a man in this town who claims he can and has gone from here to Atlantic City on four gallons of gasoline. He has a four-cylinder 50 h.p. and there are two other cars in town of the same make and both the other owners claim it takes them twice that amount. Let us have facts even if they are not always as pleasant as we would like them to be.

Note by the Editor.—The article referred to by our friend was intended to show how low the cost of running might be if the car were used with care and under favorable conditions. Take the case of tires alone, to which Mr. Dickerson refers; the mileage depends upon conditions so varying that figures are not to be relied upon with anything like accuracy. The speed of the car, the road surface—not only as to whether it be oiled or not but whether it be of clay, sharp sand, loam or gravel—the load on the tires, the inflation, the use of the brakes, the speed taken on sharp curves, the fit of the tires, and quite likely other considerations, not only affect the wear of the tire greatly but as much as two or three fold. Then the use of protectors and inner linings often double the mileage.

And something like the same condition applies to each of the other items of cost of upkeep. As showing the other extreme of cost the article of a clergyman on another page will be read with interest.

The figures given in the article in our May issue were taken from a reliable source. We regret if they were misleading.

Rust Ruins Rubber.

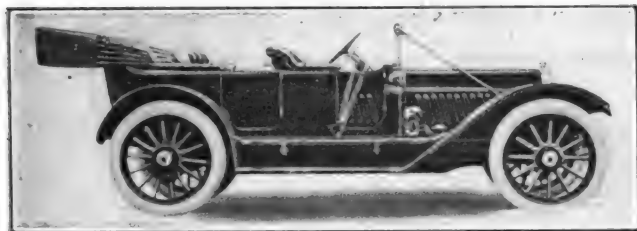
The above alliterative heading is strictly true.

Rust eats into rubber tires like lye. It is usually formed on the rims and then gets on to the envelopes of the tires near the beads. In time this rust will eat through the rubber and attack the canvas as well. It is best to remove the tires from the rims when this discoloration is noticed. Get the rust off the tires first, then take some heavy emery cloth and clean off the rim with it, as well as possible. Next use some finer emery cloth and rub the rim until it is thoroughly free from the deposit and is smooth. If the rim is quite rough and uneven, first take a file and smooth it down before applying the coarse emery cloth. After making the rim perfectly smooth re-japan it with one or two coats, and after this dries, rub it down again with the emery cloth. This should entirely eliminate the rust, and make a smooth rim for the bead to fasten on, thus also doing away with the danger of tearing the latter every time the tire is removed. Another preventive of rust is flake graph-

ite. To apply this to the rims, put on them a coat of shellac to which has been added enough graphite to form a thin paste. Graphite may also be used in the place of chalk or soapstone between the inner tube and the shoe. It is less injurious to the rubber, is more lasting, makes a good fit of the inner tube and reduces the heating. This, of course, refers to flake graphite.

The \$5,000 Olds.

Color—Optional.
Seating Capacity—Seven persons.
Clutch—Cone.



Oldsmobile Limited Touring Car.

Wheel Base—140 inches.
Gauge—56x60 inches.
Tire Dimensions—Front, 43x5 inches; rear, 43x5 inches.

Brake Systems—Contracting and expanding on both rear wheels.

Horsepower—(A. L. A. M. rating) 60.

Cylinders—Six.

Arranged—Vertically, under hood.

Cast—In pairs.

Bore—5 inches.

Stroke—6 inches.

Cooling—Water.

Radiator—Cellular.

Ignition—Jump spark.

Electric Source—High tension magneto and storage battery.

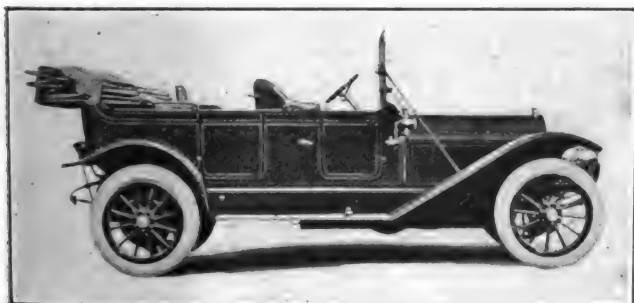
Drive—Shaft.

Transmission—Selective sliding gear.

Gear Changes—Four forward, one reverse.

The \$6,000 Pierce-Arrow.

Color—Optional.
Seating Capacity—Seven persons.
Clutch—Cone.



Pierce-Arrow 66 H. P. Seven Passenger Touring Car.

Wheel Base—140 inches.

Gauge—56 inches.

Tire Dimensions—Front, 37x5 inches; rear, 38x5½ inches.

Brake Systems—Contracting and expanding on both rear wheels.

Horsepower—(A. L. A. M. rating) 60.

Cylinders—Six.

Arranged—Vertically, under hood.

Cast—In pairs.

Bore—5 inches.

Stroke—7 inches.

Cooling—Water.

Radiator—Cellular.

Ignition—Jump spark.

Electric Source—High tension magneto and storage battery.

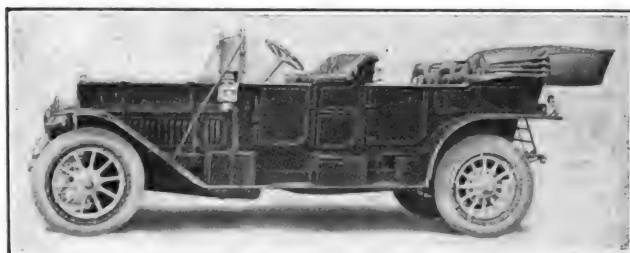
Drive—Shaft.

Transmission—Selective sliding gear.

Gear Changes—Four forward, one reverse.

The \$6,000 Thomas.

Color—Russian, green, black, blue, red, or maroon.
Seating Capacity—Seven persons.



Thomas "Six-Seventy" Touring Car KC.

Clutch—Three disc.

Wheel Base—140 inches.

Gauge—56 inches.

Tire Dimensions—Front, 38x4½ inches; rear, 38x5½ inches.

Brake Systems—Contracting on countershaft and expanding on both rear wheels.

Horsepower—(A. L. A. M. rating) 72.6.

Cylinders—Six.

Arranged—Vertically, under hood.

Cast—Separately.

Bore—5½ inches.

Stroke—5½ inches.

Cooling—Water.

Radiator—Honeycomb.

Ignition—Jump spark.

Electric Source—High tension magneto; or dry batteries and spark generator.

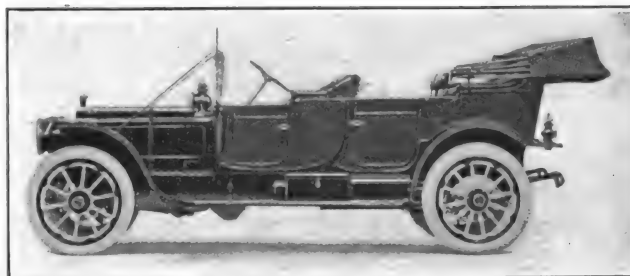
Drive—Double side chain.

Transmission—Selective.

Gear Changes—Four forward, one reverse.

The \$5,000 Packard.

Color—Body and door panels, Packard blue striped with Packard gray; under body, bonnet, fenders, etc., black; running gear, Packard gray striped with black.



1912 Packard "Six" Touring Car.

Seating Capacity—Seven persons.

Clutch—Dry plate.

Wheel Base—133 inches.

Gauge—56½ inches.

Tire Dimensions—Front, 36x4½ inches; rear, 37x5 inches.

Brake Systems—Contracting and expanding on both rear wheels.

Horsepower—(A. L. A. M. rating) 48.6.

Cylinders—Six.

Arranged—Vertically, under hood.

Cast—In pairs.

Bore—4½ inches.

Stroke—5½ inches.

Cooling—Water.

Radiator—Cellular.

Ignition—Jump spark.

Electric Source—High tension magneto and storage battery.

Drive—Shaft.

Transmission—Progressive sliding gear.

Gear Changes—Three forward, one reverse.



This department is intended as a "trouble clearing house" for car owners, dealers and repairmen. Inquiries in relation to marine motors will likewise be answered, as they are of interest to car owners and others who use the two-stroke cycle engine.

Readers are requested to make criticism and comments or to freely discuss any subject of interest to the automobile industry, and to add information of their own experience in remedying troubles.

Inquirers are asked to give the fullest information in every case so that replies may be made intelligently, and thus be of interest not only to the inquirer but to others.

880 Expects Rather Too Much.

From L. C. Rouse, Michigan.—I am driving a Model 10, 1909 Buick. This car has given me excellent service excepting magneto trouble. Last fall when I reduced the speed of the car below 12 miles per hour, running on high speed, the cylinders would begin to miss, but on throwing the switch over on the batteries, it would play in on all cylinders fine, and all cylinders would hit as long as the engine would turn. On driving over 10 or 12 miles per hour the magneto troubles disappeared. I took this car to a garage man who was claimed to be an expert on Buick machines and he took this trouble out. But this winter I had the machine overhauled and cleaned by another garage man and when I started the car out, I found I had the same old magneto trouble. I recently wrote the Buick about the trouble and I quote you the substance of their return letter from their technical department, which shows on the face of it, they have not diagnosed the case at all.

"There have been improvements in the last year or so in magnetos as in all other motor devices. If you equip your car with a later model magneto, possibly the Splittorf, which we are at present using, you will probably find that it throttles down more easily. It is true, however, that the carburetor with which these cars were originally equipped, while it was the best made at the time, is not as satisfactory for slow speed work as some of the later models."

As before stated when the car is left working on batteries, it works perfectly at all times and under

all conditions. It runs in my mind that possibly my trouble may be in the platinum contact point, for I have to screw this contact point down pretty hard to make the machine run as it should and develop the power. The garage man who recently adjusted this part of the car satisfactorily has moved out of the country and I have not him to consult with. If you can help in the solution of my trouble I would very much appreciate it if you would do so by return mail.

There is a knock in my motor. It sounds as though it was a loose connecting rod, but on several examinations these have always been found to be tight. We have also examined the main bearings and have found them tight and properly adjusted. The knock is very pronounced, working under a pull and with part of a carburetor, but can hardly be heard when the car is running with no carburetor opening. Our local garage man thinks that one cylinder in lighting too early and may be the cause of improper adjustment of the magneto. It might be well to add that the magneto is a Remy.

Reply.—We fully agree with the Buick Motor Co., in their reply to you, and in addition have to say that with a car, as well as a magneto, three or four years old, you should not expect such speed flexibility as in one of more modern design. Incidentally, you have explained, probably unconsciously, that your trouble may not be in your magneto, but elsewhere. This model car is equipped with dual ignition, the primary battery current being stepped up to high potential for the secondary current by means of a vibratory coil. The fact that you have to adjust the vibrator closer than formerly indicates that it takes a stronger current even on the battery circuit to ignite at low speed. If a stronger battery current is needed, of course it would take a stronger magneto current. It should not be necessary to adjust vibrator contacts extremely close. Your secondary wiring or your distributor may have leaks that will reduce the potential of the secondary current, or your spark plug terminals may be not sufficiently close together. You should carefully clean your distributor and inspect your entire wiring for possible leaks. If this does not remedy the trouble, shorten the gaps at the plugs by bending the electrodes. If still your trouble is with you, see if your inlet valve stems are not rather loose in their guides. Such leaks as a condition like this would produce, would be sufficient to make your mixture so "lean," at low speed with throttle pretty well closed, as to be hard to ignite. You may be able to overcome this by opening the fuel needle valve slightly for slow speed adjustment, to make the gas at the carburetor slightly richer, but you would need to reduce the tension of the auxiliary air valve spring slightly that your gas would not be too rich at high speed. If the air has sufficient velocity through the fixed air inlet to properly vaporize the heavy gasoline, it will frequently compensate for leaky valve stem guides. It would be impossible for a knock to occur in one cylinder as a result of improper adjustment of the magneto, but a slight short-circuit in the distributor might possibly cause it. This might also account for your not being able to run on the magneto at low speed. It is more probable that an accumulation of carbon in one cylinder causes pre-ignition. A physician's stethoscope applied to each cylinder in turn will locate the knock. The cylinder will have to be removed for inspection. The looseness may be at the upper end of the connecting rod.

881 **Carbon Removers.**

From Harold Rutley, California.—1—When Flash decarbonizer is used I understand that the carbon is blown through the muffler. I should think this would have a tendency to clog up the muffler. Would it be any advantage to open the cut-out while using Flash?

2—When using Michener's Chain Carbon Remover, where does the carbon go to?

3—After using either "Flash" or Michener's "Chain" is it necessary to change the oil in the crank case?

4—When kerosene is injected into the cylinders and left to stand all night I should think some would run down into the crank case. Would this do any harm when mixed with the oil?

Reply.—1—Flash decarbonizer does not clog up the muffler. The manufacturer claims that carbon or soot collects in the muffler as much as elsewhere, and that the powder will clean the muffler as well as other parts of the motor, and while it is advisable to open the cut-out we do not believe any trouble would result if it were left closed. In using it see that there is compression in each cylinder. Where there is an absence of compression Flash decarbonizer will not remove all the carbon by one application, as it would be blown out before it could vaporize. Don't use Flash decarbonizer on a car where the batteries are weak, as you cannot get a hot spark from weak batteries, and unless you have a hot spark Flash decarbonizer will not readily vaporize.

2—When the Michener chain is in the cylinder the rapidly moving piston throws it around so violently that the hard scale of carbon is scoured off, pulverized and thrown out the exhaust. Some use these chains without putting the kerosene into the cylinder with them, but after using the chains in all the cylinders and taking them out they inject the kerosene through the air intake of the carburetor. When the kerosene is poured into the cylinders with the chains, in some instances, it might be advisable to clean out the oil in the crank case, as in some engines the piston rings allow the kerosene to go into the crank case.

882 **Electric Current.**

From E. H. Ashcroft, Pennsylvania.—I wish you would let me know your opinion as to whether or not any of the electric horns on the market could be used in connection with the Ford magneto, same as electric lights are connected. I have no fear as to the magneto, but the question is whether or not the motors on the horns would stand the current. I have no means at hand to test the overflow of current after a sufficient amount is utilized for firing purposes. If you can test this out and publish your results I think it will be appreciated by the large army of Ford users.

Reply.—If your electric horn will stand a 12-volt current, which we think it will not, you can wire from your magneto. Twelve volts are equivalent to eight dry cells, and no one should think of connecting eight cells to an electric horn. You could connect a six-volt resistance in series with your horn, a six-volt lamp for instance and this might be satisfactory. The lamp would only burn when the horn is being blown, and the horn would not operate if the lamp were removed or burned out. It is our advice not to try to do any "stunts" with anything so important as a danger signal. If it should fail without warning, as it might, and an accident should occur, you would

be morally at least, guilty of a serious disregard for life and limb.

883 **Trouble in Starting.**

From John E. Hughes, Pennsylvania.—I own a Model T Buick which has been giving me a great deal of trouble lately to get it started. It is equipped with a type S Remy magneto, coil and circuit breaker. I use the battery for starting. When I switch onto the battery and take the plugs out and lay them on the cylinder, and then press the button on the switch I get a spark on both plugs. But when I crank the engine there is no spark at the plugs. The size of the spark I get when I press the button is not much larger than a common pin-head. Do you think that is large enough to cause an explosion? I have tested the wiring for grounds but find none. There are three wires run from the switch, red, green and yellow. I had the engine running about two weeks ago but had considerable trouble getting it started. It did a missing and backfiring. The compression and valves are in good shape. I never had a bit of trouble with the car all last season. It started very easy. I use A C spark plugs. Now if you can tell me what my trouble is, I would be very thankful.

Reply.—The fact that you get two sparks at once indicates that you have a short circuit in your distributor, which is a part of your magneto. The Model T is a four-cylinder motor using Model S Remy dual ignition. The colored wires should be connected to the same colored binding posts, both on the magneto and switch. Your magneto should be overhauled by someone who is familiar with its construction. The Remy people have service stations all through the country, one at New York, and possibly one even nearer you. We advise you to write them. They will advise you the nearest service station, to which it may have to be sent, unless you are able to get someone who knows how to make necessary repairs. We do not advise meddling with magnetos except with full understanding of them. The makers should do this.

884 **A Missing Cylinder.**

From Sidney Prince, Massachusetts.—I have a case of missing in the front cylinder of my Model 24 Overland car that I think will stick you. Here are the conditions: First the car is likely to start off hitting on all four regularly for about 100 feet, when she will suddenly stop firing in the front cylinder and no amount of adjustment in the carburetor, or spark plug, or coil, changing or cleaning, will induce it to resume firing again. Now this is what I have done in an attempt to overcome this trouble: First, I went carefully over the timing of the valves, and found them all right, according to the mark on the flywheel. Next, I tried the coil by bringing the piston up to the firing point on this cylinder, and found that all right. Next I tried the spark plug by detaching the wire from the plug and holding so a spark would jump from the wire to the plug, and found this all right. Next I cleaned the timer with no better result. Now what is the trouble? Compression is good, valves are working properly, coil is vibrating at all four units, timer is all right and the plug is all right, but I cannot get even one shot from this cylinder after it stops firing, not at any speed. If you can tell me how to get over this trouble in your next issue you will greatly oblige me.

Reply.—You have tested out the four units of your

coil at slow speed, but not at high speed. This you can very easily do by transferring the primary and secondary wiring of the coil unit that supplies ignition to the first cylinder to one of the other units, leaving the plugs connected as they are. If the first cylinder then runs without missing, and the cylinder supplied by the No. 1 coil misses instead, it will show conclusively that the coil is defective, which we believe to be the case, in that the vibrator contact may have to be renewed, that the condenser of the coil may have become perforated from too excessive voltage, or the secondary wiring of that unit has become broken down. Another method of proving out the coil would be to use a single vibrating coil instead of the unit that may be giving trouble. A defective plug might cause the trouble, although it would hardly stop firing instantaneously, firing intermittently. Sometimes accumulations of oil in the timing gear cases will cause trouble with the cylinders next to them, from excessive lubrication, resulting in fouled spark plugs. If the exhaust valve stem sticks in the guide, it will also stop the action of one cylinder.

885 Certain Air-Cooled Engine Questions.

From H. J. S., Iowa.—Referring to an air-cooled four-cylinder motor, will you give me the following information?

1—Will too lean a mixture cause the motor to heat?

2—When the intake valves close from 35 to 50 degrees on the compression, why is not the gas forced back into the manifolds?

3—In setting air-cooled engine valves in the factory, I have noticed that the intake opens before the exhaust is fully closed, there being a lap of about 10 degrees. What effect would this have towards cooling the engine?

4—What is considered best to oil valve stems with on the exhaust side of an air-cooled motor?

5—My four-cylinder air-cooled engine will heat beyond the proper point of greatest efficiency, if the intake is closed 30 degrees after the center on the compression stroke; but when it is set 50 degrees off, it gives more power at any time and cannot be overheated. Can you tell me why?

6—Will taking the heated air into the carburetor have a tendency to make an air-cooled engine heat? I would like to hear from others users of air-cooled motors.

Reply.—1—Too "lean" a mixture should not cause a motor to overheat, although a very lean mixture timed very late might lead one to think that overheating was a result of the lean mixture instead of the late timing. 2—On high speed only can the inlet remain open on 35 to 50 degrees of the compression stroke. Such a long "lap," as it is called, is rather unusual, however. 3—Do not see how it could have any cooling effect. 4—Nothing much better than kerosene, with perhaps a little graphite added. 5—We cannot, unless possibly a part of the charge entering the cylinder is driven back through the inlet valve, and thus cools the motor, this gas being drawn into the next cylinder in the cycle, and the motor gives more power on account of the cooling effect. 6—The small amount of heat taken into the cylinder from a heated air intake, to our mind should not materially affect the motor's heating.

886 Experience With a Stationary Engine.

From G. K. Watson, Mississippi.—From the description given in *The Automobile Dealer and Re-*

pairer, of March issue, I will attempt to set Mr. Jones straight by relating similar experience with a one-cylinder stationary engine that at times acts like his motor. I find that my engine gives almost twice the power when starting from a standstill or cold engine. I grind corn into meal with it, and just as soon as the water begins boiling, I must close off part of the feed and open the millstones just a little when the engine will continue all day. If this is not looked after, the engine will stop altogether. Have cut off the switch and the engine kept on. The engine pounds fearfully. I would say that Mr. Jones might look after his cooling arrangement and if water-cooled, clean out all the water cavities, for if the circulation is bad, he will find that to be his trouble. I had my hopper shake loose and dropped a nut into the water jacket which wedged between the cylinder wall and outer portion of the water jacket. This gave me trouble similar to that of Mr. Jones. I had grains of corn fall into the water jacket and cause trouble. If Mr. Jones will place a nut or something of the kind tight in the water jacket, just high enough to be opposite the compression chamber, he will find when his engine gets hot enough he can cut off his electricity and the engine will run irregularly.

887

Sooted Cylinders.

From Compression, Illinois.—What would cause two cylinders to soot, the exhaust valves and the other two to stay clean? The four cylinders had the same compression when the valves were clean. Would shortening the oil hooks on the connecting rods eliminate this trouble? If two cylinders overheated, would the other two overheat also? If an engine had little compression but did not misfire, would it overheat? Please tell me how to adjust the float level in the Schebler Model L carburetor. On starting this year my engine overheated badly and I had to shut nearly all of the gas off at the needle valve and dials. My engine gets hot yet, and is sluggish. What is the reason for this? Is it a heavy float? Does carbon cause an engine to lose compression? About how far could a car run to score the cylinders, with the water not circulating?

Reply.—You neglect to state the name of your motor. Too much oil or imperfect ignition will usually cause sooting of certain cylinders. We think in your case that probably ignition is faulty in the two cylinders, or that the rings on the piston do not fit as they should, judging from the question you propound as to whether a motor would overheat if it had little compression. Shortening the hooks on the connecting rods probably would not injure your motor, which looks as if it was pretty well worn out now. Two cylinders only might overheat. To adjust the float level bend the float lever. We do not believe that bending the float lever to change the float level will ever help conditions. Motor is probably pretty well worn out, which is the reason for heating, possibly assisted by clogged water jackets and radiator and poor water circulation. Motor is sluggish probably because you cannot give it sufficient gasoline. We are afraid your trouble is more serious than from a heavy float. Replying to your query as to how far a car could run without water, we have to say that we do not happen to have a car on which we would care to try the experiment. If you will furnish the car, we might consider it. Our advice is not to endeavor to solve this query yourself, unless you are very "long" on cars or motors. We do not see how a carbon deposit could cause loss of compression.

888 **Poor Compression.**

From Fred A. Strother, Georgia.—Will you kindly give me a remedy for the following complaint in my motor? My car is a Maxwell, Model A A, 17 h.p., two-cylinder. It runs weak in high gear, but has an abundance of power in low gear. One cylinder has good compression and one very weak. I think this weak compression is due to the weak power in high gear. Please tell me how to proceed to make compression good, as both cylinders should have compression alike. The car is second-hand. It has been used one year. It has battery and magneto ignition.

I see a carbon remover advertised in your journal called "Flash." Would you recommend the use of this to remove carbon from cylinders?

Reply.—Your poor compression in one cylinder is not a result of the weak power in high gear, but the weak power is a direct unqualified result of the poor compression. To remedy the poor compression, it may be necessary to purchase a new cylinder, a new piston and new rings, separate or all, unless caused by leaking valves in which latter case correct grinding should remedy the trouble. We would not carry the advertisement of "Flash" carbon remover, unless we could recommend it.

889 **Trouble in Starting.**

From H. W. Guth, Ohio.—I am an owner of a 1912 E. M. F. and after having kept my machine stored all winter, I find that I have considerable trouble in starting it. Have had my dealer adjust the carburetor and have also put in new batteries, but still have to give from 8 to 12 quarter turns of the crank after priming it to make it start. Sometimes it will start on the third or fourth turn when warm, again it will not. If it stands for 15 or 20 minutes, I have to do as mentioned above. My machine has also developed a noise in the rear gear, which comes and goes. More pronounced when going down grade, but the noise does not seem continuous. It seems to let up a little when the gasoline lever is at a certain position.

Reply.—Your car uses dual ignition, a Splitdorf low tension magneto, with a single non-vibrating coil and four cells of dry battery. We should judge that there is need of an adjustment of the interrupter contacts, and a possible smoothing of their surfaces, although there may be a short circuit in the distributor. The magneto should be looked over by some one who is familiar with magneto construction. The noise which seems to yield to a movement of the gasoline lever, is probably due to too much gasoline.

890 **Over Heated Exhaust Pipe.**

From Sherman Salverson, Minnesota.—Please let me know what is the trouble with my two-cylinder Model D Reo car. The exhaust pipe of the rear cylinder gets red hot. I have the coil and the carburetor adjusted as right as I can get them. I run with the batteries. They are new. The compression is good. Please let me know what is the cause of the exhaust pipe getting red hot and the water boiling over. I have a Reo carburetor.

Reply.—The circulation of water in the water jacket is probably insufficient to carry off the heat from the rear cylinder, or else the rear cylinder is doing all the work. Your water jacket or radiator may be either or both partly clogged with lime or other deposits. Your car, you should remember is not a late model, and has undoubtedly seen considerable service.

891 **Car Lacks Power.**

From S. Neligh, Indiana.—I would like you to help me out. I am somewhat of a trouble finder, but I am really up against it now. The trouble is with a Model B 1909 Reo. The motor runs smoothly, but hasn't much power with the compression relief in. But when I throw out this relief, the motor misses and causes the machine to jump and jerk. The compression is good for I have ground and adjusted the valves and replaced a new stem on the intake. The ignition system is O. K. I have tried a new Model D Schebler carburetor, one recommended by the factory. I have tried both old and new carburetors at all adjustments. I will thank you very much for any information you can give me.

Reply.—It looks very much as if your exhaust valve springs were too weak, or that your new inlet valve stem was sticking in the guide.

892 **Steering Wheel Play.**

From J. A. Knowles, Maryland.—I have an E. M. F. 1910 car and find that my steering wheel has considerable play in it. Can you tell me if there is any way to adjust the same, and if so, how do you make this adjustment?

Reply.—We are of the opinion that no adjustment is provided for taking up play in the steering post at the lower end, although from your inquiry, one might suspect that the wheel was loose on the upper end of the steering post.

893 **Ignition Trouble.**

From Charles Pfeiffer, Kentucky.—I want to ask about my ignition. I have an Eureka D. C. magneto which lights my car and also runs the ignition for the engine, but I think the voltage is too strong for my Heinze coil and causes the contact points to stick, hence the engine misfires. My magneto develops a 20 volts current and the coils are 5 volts. What can I do to cut the voltage down to harmonize with the coil? It works somewhat better when I have the electric lights burning. I start the car with 5 dry cells and can also start it on the magneto if necessary.

Reply.—The Eureka D. C. Magneto is manufactured by the Henricks Novelty Company, Indianapolis, and is supplied with a centrifugal governor, which should regulate the armature speed to produce a current of not to exceed 12 volts, which should neither fuse your ignition contact points, perforate your condenser, nor break down the secondary coil wiring. This magneto is supplied on order only, and not to be used for ignition, of a 20-volt capacity, which is possibly the special type you have. You will find this concern to be very willing to help you and we suggest that you advise them just what trouble you are experiencing. They will probably help you out by suggesting a change in the wiring to include some resistance in your ignition circuit, or may give you a weaker spring that will give you a lower voltage at the magneto. We advise that you also give them a sketch of how you have your lamps wired up, indicating the lead of every wire and just to what connected.

894 **Not Enough Electric Power.**

From Andrew Speltz, Minnesota.—I have a Ford car, model T, and run electric lights on the magneto. Each light is 10 candle power. The magneto seems to be weak

as it will not run the lights and furnish ignition current at the same time. The car runs good on the magneto but begins missing when the lights are switched on. Is it possible that the lights may hurt the magneto so that it may have to be re-charged? What does it cost to have a magneto recharged? Would it be possible to have another magneto or generator of some kind to run the lights? Have connected the wires from the magneto plug to the switch, then to one light and from there to the other light, and grounded the wire on the frame.

Reply.—There is not enough power in Model T Ford magnetos to run lamps of too high candle power. You have diagnosed your case exactly. The remedy is to use 4 c.p. lamps of 6 volt capacity. All such wiring could have a fuse in the circuit to prevent demagnetization from too severe use of the current for combined ignition and lamps of excessive candle power. We do not know the exact cost of recharging Ford magnetos. You had better address the manufacturer, the Ford Motor Co., Detroit, Mich. There are probably a dozen or twenty, probably more, manufacturers who are constantly advertising electric lighting outfits for automobiles, with prices ranging from \$10 up, some driven by friction and others geared.

895 Wiring Information.

From D. A. Jamison, South Dakota.—In wiring a stationary gas engine make-and-break, by using two sets of batteries, four each and two coils, would you get twice as strong a spark as you would with one set and one coil? I tried this with two sets of run down batteries either of which did not run without missing, and appeared to get good results. I enclose a sketch of the way I wired. Was this right? Is there any better way of using batteries that are run down to 5 amperes or lower?

Reply.—Four dry cells for make-and-break ignition connected in series are hardly sufficient. You would find six would give you much better results, last longer and give you a hotter spark when partly exhausted. For very best results and materially increased life, two series of six dry cells connected in parallel are far preferable, but a single coil should be used and that in the circuit between the switch and ground rather than elsewhere, to reduce liability of accidental short circuit and loss from induction when current is switched off. The method you used gave you increased amperage or quantity of current, but did not increase the strength. You would have the same amount of alcohol if one pint was placed in a quart bottle, that you would have if another pint was put in a quart bottle, and filled with water. In the first case you have more strength and less volume and in the other less strength and increased volume. You would have the same amount in both instances. It might not be strong enough to do your work if the strength was reduced.

896 An Offensive Knock.

From O. Wheat, Texas.—I have a Buick No. 10 car, which on running over rough roads or down hill without declutching, gives a ringing knock in the engine. This knock is not apparent when going up hill or when going over smooth roads, or when the engine is running idle. The engine bearings are all right, and it has good compression. The car has been running about 5000 miles, and has been well cared for. Can you tell me how to avoid this offensive knock?

Reply.—We have received similar complaints and have ascribed the condition to the slipping of the clutch, which occurs as the alignment of the transmission and engine

is destroyed by a slight distortion of the chassis frame when one corner is raised as might result from rough roads.

897 Coils and Vibrators.

From John W. Hall, Iowa.—I have just taken some Ford 1910 cars in trade and want to ask you if they would not work better with a master vibrator than the 4 unit coil with 4 vibrators as now on them, and also should the master vibrator be used with the 4 unit coil or should it have a one unit coil for itself?

Reply.—The object of a master vibrator is to secure the same adjustment for all four units of the coil, an almost utter impossibility with four separate vibrators. You can therefore get better and more synchronous ignition with a master vibrator and four non-vibrating coil units. There is no object in using a master vibrator with a single coil, nor can a single coil be used except there is a secondary distributor on the motor. Master vibrators and coils used on the Ford motors are usually specially designed for use with that particular type of magneto. You should be particular to get a guarantee that the outfit will stand up on Ford cars, as all coils will not, owing to the high voltage of the ignition current under certain conditions.

898 Wiring for Lights.

From W. Edgar Woods, Pennsylvania.—When wiring for electric lights, how do you connect the tail lights? I wire the head lights as per diagram in the copy I received last November. They burn good until I wire in the tail light and then none of them will burn. If you will tell me how to wire the tail light, I will appreciate it very much.

Reply.—Attach a wire to the one that leads from the switch to the headlights and lead it to the tail light, connecting the other lamp terminal to some metallic part of the chassis. While the headlight lamps are connected in series 6-volt lamps are used, but a 12-volt lamp should be used for the tail light, as it is in parallel with the headlight series. If you could get 4-volt batteries you could connect the three lights in series, which you have evidently tried to do with 6-volt lamps. We are not prepared to state whether or not you will have sufficient current for all three lights. You can tell very easily by experimenting.

899 Friction Drive Slips.

From J. T. Kellie, Nebraska.—I have a Model N Ford with Wizard magneto. It is driven by pushing against the side of the fly wheel. It becomes greasy and slippery. The boxing and joints are tight, but there is grease enough around the thing so it does not work well. What can I do for it? Also, what can I do for a friction drive slipping from the same cause?

Reply.—The Wizard magneto is manufactured by the Hercules Electric Company, Indianapolis, Ind., in both belt and friction drive, a centrifugal governor on the armature shaft preventing excessive speed and too high voltage. It may be necessary to get a new friction, or you can possibly take a light cut off the leather face in a lathe. It is quite likely that an uneven face is more the cause of slipping than the excess grease, although these magnetos are not supposed to drive against a greasy surface. If you could set the magneto so it would drive against the face of the flywheel, rather than against the side it might escape much of the grease. This model Ford is several years old and you might be able to pre-

vent the grease exuding from the bearing by fitting a new bushing in the flywheel and main bearings.

Fuller's earth or ordinary whiting will absorb much of the surplus oil and grease. It should be applied dry, and then scraped off after it has absorbed all the grease and oil it will. Means should be employed to keep mineral oil, such as is used for lubricating gas engines, away from leather friction surfaces, as it soon burns leather and reduces its frictional properties. As soon as it begins to slip, the heat generated as a result of the slippage, completes the damage that the oil starts.

900 A Leaky Carburetor.

From Floyd J. Six, Indiana.—The carburetor on our 1911 Ford car, which is a 1911 Holley, leaks pretty badly. It is just a continual drop of gasoline from the bottom of the carburetor. I took it off, cleaned it out, and thoroughly dried the float, and gave it two coats of shellac. I examined the valves, but they seemed all right. I put it back together, but it leaked just the same. It does not leak while the engine is running. Can you tell me what is wrong?

Reply.—Unless there is a defect in the carburetor the leak is caused probably by an imperfectly fitting gasoline float valve, although you may have set the float valve too low. The remedy is to take the carburetor to some good mechanic to grind the gasoline float valve to its seat, by means of some ground glass and oil, after which it should be tested to see that it does not leak before replacing it on the car.

901 Trouble With Two Cylinders.

From Earle N. Haldeman, Missouri.—I have a Buick M 17, which I ran last year from June until November, and I have always had trouble with cylinders Nos. 1 and 2. The oil passes the cylinder rings and "fouls" the plugs. I have replaced the rings once and this does not help matters at all. I also have some trouble with my engine starting after it gets cooled off, say over night. The way I have to do is to lay a piece of glass or something over the carburetor before I can get it to start. Now I know the ignition is all right for I have had it examined by one, who is supposed to be an expert. I am using a Schebler carburetor but do not know the model. I also use A. C. plugs, which I find give me the best results. I also use Polarine oil. Now if you can tell me any oils, plugs, carburetor, or anything else that would help me, I would be pleased to hear from you at once. I would like to hear from you by mail as to this trouble at once. You may also put it in your next issue as it might help.

Reply.—You should clean the accumulated oil out of the timing gear housing and reduce the amount of oil supplied to the two front cylinders. If you do not have any trouble with the other two cylinders, it apparently shows that the oil itself is all right. It is sometimes found necessary to use a thicker oil on a motor that has become somewhat worn. Polarine oil in the West is manufactured in three grades, light, medium and heavy, we understand, while in the East there is but a single grade offered. Your carburetor is probably a Model D. It is to overcome the trouble you are experiencing that very many owners are equipping their cars with the later Model L, as advised by the Buick Motor Co. The Model D carburetor is practically obsolete now for motor car work.

902 Two Cylinders Miss.

From J. M. Sweely, Pennsylvania.—I have a Ford Model T nearly new. Have run 1,500 miles only. When on high from 1 to 2 of the cylinders miss. I have the spark plugs in perfect shape and I can't find out the reason why all 4 plugs won't respond.

Reply.—There is a small carbon brush and spring on top of the magneto. If you will remove this, you will likely find some hair-like particles of carbonized fiber attached to the brush. These should be removed very carefully. If this does not remedy the trouble, try reducing the spark plugs gaps a little. Too wide gaps will sometimes cause missing at low motor speed.

903 A Metallic Knock.

From W. E. Talbott, Maryland.—I am going to trouble you with another question about my little Ford Model N. Lately a very metallic knock has developed in one cylinder when the throttle is open and she is pulling hard on a hill; close the throttle and it is not so bad. All the motor bearings are in good shape, yet there is a slight click in the cam shaft that can be stopped by pressing against it with a screwdriver. Would this cause the knock? Giving more gas in the carburetor adjustment will lessen the knock somewhat. I have been using coal oil in the cylinders to prevent carbon, so don't think it is pre-ignition. Could anything get out of place so that the spark would be made in one cylinder too early? I have not found out which cylinder it is on account of it only knocking on heavy grades. Tell me a way to locate the cylinder.

Reply.—Unless the parts are very badly worn the lost motion in the cam shaft should not cause the knock. It can be caused by a number of conditions, but we think most likely the motor cylinders, pistons and rings are pretty well worn out. If the timer is badly worn it might cause the knock from pre-ignition in one cylinder. You can locate the knock by using a physician's stethoscope and speeding up the motor, more easily than by almost any other means.

904 Misfiring.

From H. Jones, Indiana.—I have a Mitchell Roadster Model T that has given me a great deal of trouble in firing or misfiring in the No. 4 cylinder mostly. The valves are ground. I put a new cylinder on, also a new Delco ignition system and a new Model L Schebler carburetor and still have the same trouble. I would like to have some reader of The Dealer and Repairer help me out if possible.

Reply.—On account of the small amount of information you give, it will be extremely hard to make intelligent reply to your inquiry. You fail to state whether the missing is in the new cylinder or in one of the others, whether compression is good or poor, and whether or not a new piston and rings were installed with your new cylinder. If the carburetor is of the proper size and correctly adjusted, and you have a new Delco ignition system, the motor should run without missing, if the motor itself is in proper shape. To attempt to tell you where you might find the trouble would take a volume or two. We advise you to write to the manufacturers of your car, who should be able to advise you, but it will be useless to write either them or anyone else without going very much more into detail than you have in your inquiry to us.

905

A Fierce Clutch.

From Rea Nunvallee, Texas.—I have a Model T Ford that has been run about 1,200 miles, and the slow speed takes hold too suddenly and causes the car to lurch forward in starting. I would like you to tell me in your Trouble Department the cause of the same and its remedy, for which I will be much obliged.

Reply.—The slow speed band is probably adjusted too tightly. Slack it back just a bit, so that it will slip a little just before it takes hold, and your trouble should disappear.

906

Motor Lacks Power.

From R. Austin, California.—I have a 20 h.p. four-cylinder four-passenger Hupmobile, Model 1911. It has a Breeze carburetor. The machine does not have power on the hills, even on the low. The compression is good. I clean the carbon out with coal oil. Would the Marvel carburetor or the Homo give any more power? The car has high tension magneto which seems to furnish plenty of spark. There is no knock, but the whole engine seems to vibrate or act as if the explosions were too heavy. Can you tell me the cause of this trouble? Second: How would you time the magneto? There are no batteries. I saw in Popular Mechanics that a piece of wire gauze placed in the intake pipe would result in increased power, and a saving of gasoline. What is your opinion of this? A friend of mine had an Elmore two-cycle car and placed a pet cock in the intake pipe which would open after he had started the machine, and he claimed he saved gasoline. He said he got but 9 miles from a gallon of gasoline before, and from 12 to 15 after its use. Will you, likewise, give me your opinion of this as a gasoline saver?

Reply.—The manufacturers of your car should be able to advise you better than we, for they have, no doubt, experimented with practically every carburetor on the market and, no doubt, have a record of such tests. We should judge from what you write that your ignition is timed too early, or that one or more cylinders are missing explosions. You should time the magneto so that the break of the contact occurs just after the piston passes the center, with the spark lever fully retarded. You could try the experiment of putting a piece of wire gauze in the intake pipe, but as you do not say whether in the air inlet or inlet manifold, we do not understand your question. We do not believe it would alarmingly increase the power of your motor. The Elmore is a two-stroke-cycle motor. The saving in fuel by this means is not unusual in this type of motor, or in four-stroke-cycle motors where the fixed air inlet is relatively small and there is inordinate frictional resistance through the carburetor. In using an auxiliary air supply of any kind it will have to be closed when closely throttling, stopping or starting. It is very unusual to find a motor running fairly successfully with insufficient gasoline, and almost the exception to find one that is not wasting more or less gasoline, at either full or part throttle. If a carburetor is given insufficient gasoline the motor will stop very easily. If a slight or even considerable excess is given it the result will be that the motor will run a trifle sluggishly perhaps, but will not be developing the power it ought.

907

Horsepower and Floating Axles.

From Bruce B. Bradford, Missouri.—What is meant by the expression, "floating axle?" What is the difference between a semi-floating axle and a full floating axle? How is the horsepower of the new long stroke engine computed? I find the A. L. A. M.

rating for this motor is not as high as that of the manufacturers and presume some different formula is used. Will you tell me what it is?

Reply.—A full floating axle is one in which the wheels have a bearing upon the rear axle housing, so that the weight of the car is carried entirely by the housing. The axle in this construction serves only to transmit the motive power to the wheels. A semi-floating axle is one in which the wheels are secured directly to the transverse rear axle. It not only serves to turn the wheels, but also to support the weight of the car.

Fig. 1 illustrates a semi-floating rear axle. In this construction the wheel is attached directly to the

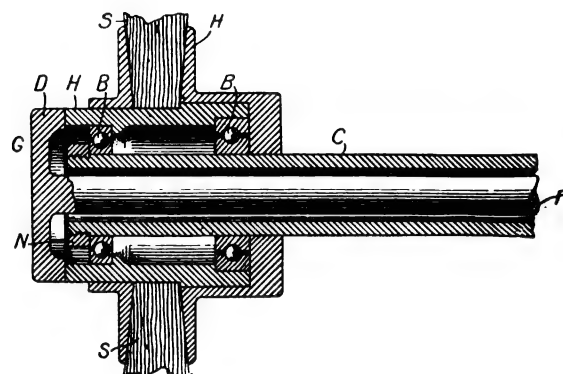


Fig. 1.—Semi-Floating Axle.

rear axle, which not only serves to propel the wheel, but also to support the weight of the car. The hub H of the wheel is a snug fit on the end of the axle F, and the keys K and the nut N serve to secure the wheel thereon. The hub cap C is not absolutely necessary, as it merely serves as an ornament, and to protect the nut N from being damaged by rust, bumps, and other hazards.

A floating type of rear axle is illustrated in Fig. 2, C representing the housing, H the hub of the wheel, S the ends of the spokes of the wheel and B the ball bearings. It will be noticed that the wheel bears

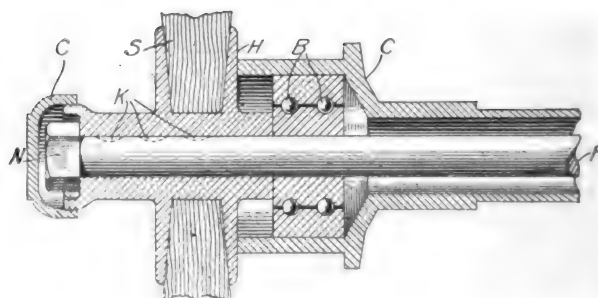


Fig. 2.—Floating Axle.

directly on the housing C and is held by the nut N. The axle F has a flanged end G, which forms a clutch that meshes with the outer edge of the hub H, the depth of the notches in the clutch and hub being represented by D. The clutch and shaft are held in place by the hub cap, and in this construction the length of axle F on either side of the driving gear and differential mechanism may be pulled out of the housing by simply removing the hub cap and without removing the wheel. Thus the differential and driving gear unit may also be removed without disturbing the axle.

In relation to the estimated horsepower of the long stroke engine, quite likely the cylinder displacement is considered, which is not the case in the A. L. A. M. rating. To properly consider the various methods of estimating the horsepower of internal combustion engines would take several thousand words, and then we should not "get anywhere," so to speak.

908

Spots on the Body.

From John O. Pounds, Ohio.—I have a new car which, of course, has a very fine gloss. I was out in the rain and washed the car when I got in. I dried it with chamois and then went over it with Liquid Veneer, rubbed it dry and polished it. But I cannot get the rain spots off. How can I take them off the body?

Reply by Mr. Hillick.—It is an open question just how badly the finish on the car was spotted, but ordinarily if the rain spots, mud splashes, and dirt smears that collected on the surface during a rain storm are thoroughly washed off the finish immediately following the car's return to the garage the varnish will clear up without showing spots or blemishes of any kind.

It is practically certain, at any rate, that if pure, clean water plentifully and properly applied, and dried off gently with a clean, lint free wash leather, will not remove the spots from varnish, polishing creams, varnish renovators, etc., will fail to do so. Washing the surface as here advised with water is the first, and, usually, the most effective remedy, provided the mud and dirty accumulations are not permitted to dry upon the varnish. If allowed to dry upon the newly varnished surface the oil of the varnish is extracted through the process of suction or capillary attraction, and wherever this occurs on the surface dull or lifeless spots appear.

Some varnishes, especially varnishes of a very elastic property, are particularly sensitive to the action of mud or dirt accumulations, and spot easily. When the water bath fails to remove the spots from the surface, they may first be rubbed with a soft piece of cloth moistened with equal parts of raw linseed oil, turpentine, and denatured alcohol containing not less than 95 per cent. of grain alcohol. Polish at once with a soft piece of blotting paper.

This remedy failing, the only cure is to clean up the surface and apply a fresh coat of varnish. The only remedy left our correspondent, so far as we are able to comprehend the situation, is to rub the surface lightly with water and pumice stone flour and apply a new coat of varnish.

909

Trouble in Starting.

From S. R. Crabb, Michigan.—I have been having trouble with my Maxwell A A runabout. Have looked through all the numbers of The Automobile Dealer and Repairer, but have not been able to find anyone that has had the same trouble as I. I noticed that my motor started hard the year I got it, along towards the fall of 1910. I laid it to the cold weather. Last year I had a little more trouble in starting, especially when the motor was cold, but after getting started would have no more trouble and the motor developed good power. Along towards the fall, the carburetor began to leak and I cleaned it but that did not stop it. The Maxwell Company sent me a new float chamber and I attached that, but that float also leaked. I lowered the float and still it leaked. I then wrote the company and they sent me a new carburetor complete. Cold weather came on and I did not get the carburetor on until this spring. After attaching the carburetor, I had trouble starting the motor. I have to prime and prime and crank and crank. Then I may get a few explosions and the motor will start only to stop in a few seconds or possibly after just a few explosions. I barely ever run the car except on Sunday and it has always had the best of care, and

furthermore I am a sort of "old maid" about an auto, everything has to be just right. I have always taken care of my own car, made all adjustments, but this one has "got me." As I was saying in regard to the carburetor, the motor will not start without "dosing" it with gasoline or ether, and even after it gets warm it has to be primed at the carburetor before it can be made to start, and it may stop then in a few seconds. On the road it runs with regular explosions but will not develop the usual power or speed. I have adjusted the carburetor according to the instructions in the Maxwell instruction book, and then some, but it makes no difference. It runs along nicely on nearly a closed throttle, but after the throttle is opened about one-third way it seems to develop about its maximum speed. Upon opening the throttle clear open, the motor acts something as if the spark were retarded and doesn't seem to travel much faster than on one-third throttle. It skips and misses upon first getting started on the floor, but on the road it never misses. I ground in the valves which have never been out before and found them in good shape. The compression seems to be very good. Have been over the wiring, and the batteries test 20 amperes. Have smoothed up the platinum points in the breaker box; they are set about 1-32 of an inch apart. After grinding the valves I set them according to the marks on the fly wheel. Nothing that I have done seems to do the least bit of good. I can't make it seem any other thing but the carburetor. I am simply stuck. Should you diagnose the trouble as carburetor trouble and think some other kind would work better? Please advise me as to kind and size.

Reply.—You do not state whether or not the motor seems to get too much gasoline with the throttle wide open. This you should be able to tell very easily, for if too much there will be black smoke and if too little a slight increase in the supply would show improved conditions. We do not believe your trouble is in your carburetor so much as it is in the heavy gasoline now being marketed, yet from the fact that it does not miss on the road we are inclined to believe that your ignition is all right. It is barely possible that your motor is not timed correctly, a fault sometimes experienced with this type and model, owing to difficulty in getting at the gears for correctly timing. You should carefully go over the timing of the opening and closing of both inlet and exhaust valves. The inlet valves should open and close about on center, but should not be open before the exhaust valves close. The exhaust valve opening should be considerable before the center and the closing about on center. See that your valve springs are not set and that the valve stems are free in their guides. We hardly think you will find any trouble there as you say the motor does not miss explosions on the road.

910

Object of a Master Vibrator.

From P. W. Sandburn, Wisconsin.—Many Ford cars Model T are putting on master vibrators, which take the place of the regular four unit coil. The vibrators of the coil are all cut out by putting card-board between the points and the switch lever is let in the magneto position. Does the current still go through the coil, and of what use is a vibrator?

Reply.—The object of a master vibrator is to get absolute synchronous timing, that is to have the time of the ignition absolutely the same in all cylinders. It is a mechanical impossibility to secure this result with four separate vibrators, getting the same adjust-

ment to each, for all Mr. Hampton on page 54 in the May number is apparently still open to conviction on this point. In wiring a master vibrator the device is placed within the primary circuit. When the timer closes the otherwise open circuit, the current travels through the vibrator and each coil just as it does with separate vibrators to each unit of a four-cylinder vibrating coil, except that the energizing of the electro-magnet in the master vibrator opens the primary circuit. As the primary current is thus interrupted the electro-magnet loses its magnetism and a spring returns the vibrator blade to close the circuit. The master vibrator is usually placed between the battery and coils, although it may be located between the battery and engine "ground." The use of any vibrator is to get a succession of sparks. A non-vibrating coil gives a single spark, as does the usual type of engine-timed magneto.

911 Carburetors and High Altitudes.

From J. W. Miller, Iowa.—Will you kindly enlighten me on the subject of carburetor adjustment made necessary by the difference in altitudes? What is required in the way of adjustment in going from a lower to a higher altitude and vice versa? About what is the range in altitude before adjustment becomes necessary? Do you increase or decrease the air on ascending, as applied to a Stromberg on a six-cylinder car?

Reply.—When any adjustment at all is required, less air will be needed at high altitudes than low. We somewhat doubt that any change of adjustment at all would be required on a Stromberg carburetor under ordinary conditions of ascending elevations. The writer has ascended a mountain of some 1,800 feet and found no necessity of carburetor adjustment. Possibly some of our readers who climb high elevations may be able to give Mr. Miller the information he seeks.

912 Gasoline and Lubrication.

From F. J. P., Minnesota.—I own a 1911 Hudson 20 runabout, and instructions with the car state to fill the crank case with oil to the height of the upper pet-cock and to never let it get below the level of the lower pet-cock. In my case if it is filled to the level of the upper cock, dense smoke comes from the muffler as well as oil, and even when it is down to the level of the lower cock it smokes considerably through the muffler and gives evidence of there being too much oil. Is there any glass gauge that is reliable that could be installed to show the height of oil at any time? Is it safe to run with the oil below the level of the bottom cock if there seems to be some slight smoke from the muffler? How many miles should such a car run per gallon of oil of good grade?

Reply.—Your car should run from 18 to 25 miles on a gallon of gasoline, according to the condition of the roads, the condition of the car, and the way it is driven, while $1\frac{1}{8}$ gallon oil to 5 gallons of gasoline is sufficient if it gets to the bearings as it should. The manufacturers of your car should be better able to advise you than we, as we would have to go to them for the very information you seek. It is quite probable that a thinner oil would suit your car better than what you are using, or one with a lower fire test that would be completely consumed than one that smokes too much. We do not know of any such gauge as you describe.

913

Rattling in a Runabout.

From Dr. A. D. Grant, New York.—Will you kindly tell me through the columns of your magazine why there is a rattling noise on my 1912 Ford torpedo runabout? It sounds like a small rod rattling when the car is running 23 to 30 miles per hour. Do not hear it up to 23 miles. Thought it was the brake rods where they run through the guides attached to the truss rods, but after strapping them tight, find it is something else. It sounds like a loose glass in a lamp, but after taking the glasses out, I hear it just the same. Have tightened up all the fenders and running boards and in fact everything that could rattle, still it stays with me just the same. Can it be in the transmission or differential? If so, what can I do about it? Do you recommend the use of kerosene in the cylinders when hot to do away with carbon? If so, would the "all in one" plugs be satisfactory on my car as far as ignition and convenience in putting kerosene in, is concerned?

Reply.—We are equally at a loss as you to locate the rattle in your 1912 Ford. The New York branch is unable to ascribe any cause. We do not believe it could arise from any loose parts in either the transmission or differential, although of course it could. Kerosene, properly used, we consider a good remedy for carbon in the cylinders. The plugs mentioned are well adapted for the purpose.

Certain Points of Interest.

From Guy C. Booth, Iowa.—In the May number of your journal you give an estimate of the cost of keeping an automobile. In this I believe the estimate for tire wear is just a little low. I believe on cars of 30 to 50 h.p., running 1,000 miles per month, the tire wear should be estimated at $1\frac{1}{2}$ to 2 cents per mile. If a set of tires last 10,000 miles and cost \$100, without repairs, it would cost 1 cent per mile, and they don't very often do this.

I note C. A. Shaler & Co.'s answer to query 842, and I wish to add that with every other condition all right, rubber will quite often become spongy in vulcanizing by not having enough pressure against the part being repaired.

Quite recently I came across an E. M. F. that had a slight knock on low motor speeds. It was found to be the coupling between the pump and magneto, which had worn, allowing the magneto to give a jerk at each half revolution. This was cured by replacing the worn parts.

A two-cylinder coil with removable units caused one of my neighbors considerable grief. One of the contact springs in the bottom of the box had broken loose from the screw to which the high tension lead was fastened and the resulting space was too great for the spark to jump. This was remedied by placing another spring in the bottom of the box to renew the contact.

From experience I have learned that multi-point spark plugs do not do as good service on battery, especially dry cell ignition, as single point plugs. I drive a Cadillac 30, 1909 model, and have had a lot of carburetor trouble. I at last went to using a gasoline which tests about 55 degrees and find my troubles are gone, excepting during cool weather when I must get the engine warmed up before it will pull well. Otherwise this gasoline gives me better satisfaction than that testing at 64 to 66 degrees.

ELECTRIC DELIVERY WAGONS.

For Store or Express Use Carrying 2,000 or 1,000 Pounds.

In places where battery charging is convenient electric delivery commercial cars are in some respects superior to gasoline cars, as may readily be admitted without explanation of detail.

Generally express wagons have ribbed bodies, that is, framed and paneled from the inside, but this design has solid sides, with the upper part of the body built outward with 5 inches overhang on each side. On the lower part is loaded the heavy pieces and the lighter and more bulky pieces are loaded on top. Wagons of this kind are generally furnished with wire screens, three for each side. The frames for the screens are made by the smith. He makes them

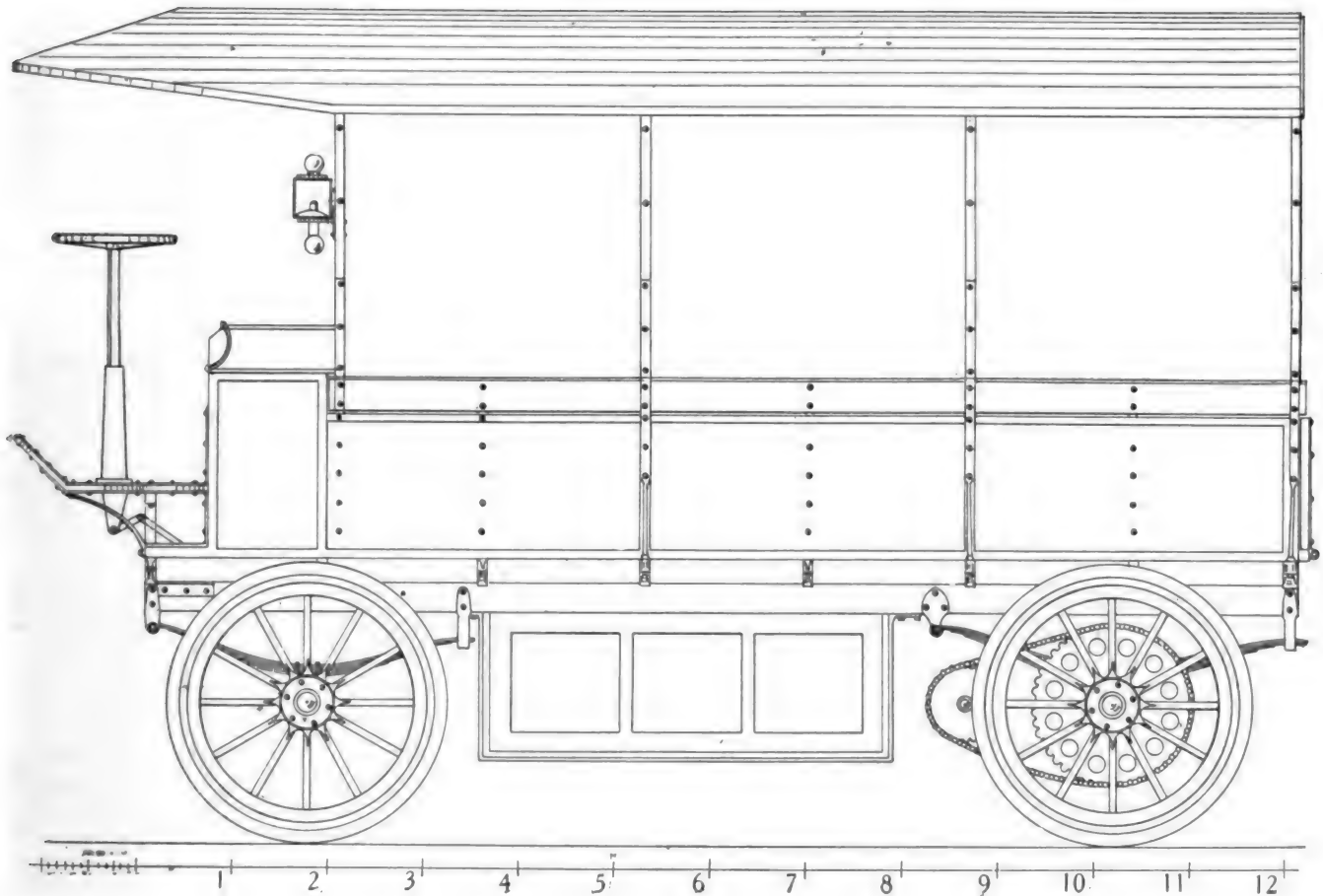
The frame is built of angle section steel; solid roller bearing axles; artillery wheels with extra large bearing surfaces for spokes; solid rubber tires 3 or $3\frac{1}{2}$ inches; two motors; forty cells, arranged in four separate units of 10 cells each. These cells are carried in an underslung compartment under the body between the wheels, by trussed frame construction.

Length of front springs 40 inches, width of plates $2\frac{1}{2}$ inches, number of plates eight, and all No. 2 steel.

Length of rear springs 45 inches long; width of plates $2\frac{1}{2}$ inches; number of plates eleven, and all No. 2 steel.

The equipment for a standard express motor truck includes the top, covered either with painted drill or rubber cloth, rubber cloth curtains for sides and rear; two electric side lamps, a complete set of tools, and a charging plug with 15 feet of cable.

The two motors are placed near the rear axle, are



Electric-driven Express Truck carrying 2000 pounds.

to size and to fit with four projecting flanges on the ends to lap over the posts and to which they are screwed.

These bodies are preferred on account of their vast loading space. The front part under the driving seat can be closed up in the rear and provided with a lid under the cushion, where small packages can be placed, being secure from being lost, if that space is for the purpose. The lower loading space is 4 feet across, 22 inches high and 11 feet 5 inches long. The upper loading space is 56 inches across, 10 feet long and 4 feet 6 inches high. The space saved is by raising the seat and extending the toe-board toward the front.

The entire length of the frame is 12 feet $2\frac{1}{2}$ inches; width across 36 inches; length of wheel-base 8 feet 6 inches and width of track $56\frac{1}{2}$ inches.

suspended from the frame and transmit power through a geared countershaft, which in turn drives the wheels, through the medium of sprockets and chains.

Generally solid rubber tires are furnished of sizes corresponding to the loads to be carried, but its method of construction permits also the use of iron or steel tires, same as on horse drawn wagons.

Working Draft of Electric Truck Body.

With the draft we illustrate a full side view of the body which will carry 2,000 pounds, also front, rear and bottom views of which we give only one-half of each. One-half of each is sufficient for practical purposes. On this body the width of frame is 36 inches and the overhang on the sides is about $7\frac{3}{8}$ inches, but for this kind of bodies the width of frame is some-

times 40 or more inches; the wider the frame the less overhang is necessary.

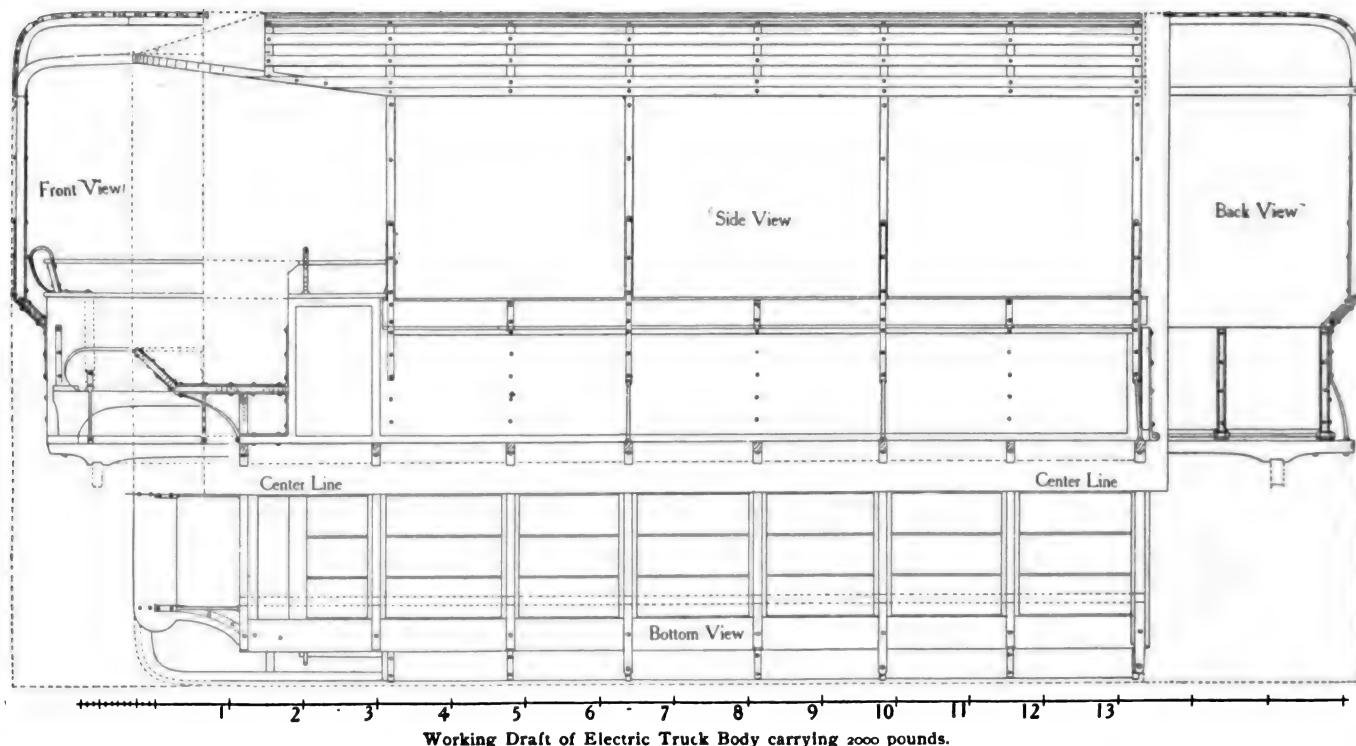
The sills on this body are $1\frac{1}{2} \times 5\frac{1}{4}$ inches, and all crossbars $1\frac{1}{2} \times 3$ inches except the rear one being $2\frac{1}{4} \times 3$ inches. The $\frac{3}{4}$ inch added to $1\frac{1}{2}$ inch thickness is for the bottom boards. The crossbars are all mortised into the sills. The lower side boards run the entire length of body, 11 feet 7 inches. There are four posts under the driver's seat which are mortised into the sills and are $1\frac{1}{2} \times 2$ inches. Two more posts are in front of seat of the same size. These posts are notched in the front and side boards $\frac{3}{8}$ inches leaving $\frac{5}{8}$ inches of the board's thickness, and are screwed against the posts; these screws are covered with the moldings. On top the posts are braced with two crossbars and two side rails lapped to-

bine the side boards, slanting boards and posts. The inside post strap bolts run through the sills and crossbars up to top rails, combining everything by bolts.

Car for 1,000 to 1,200 Pounds.

The loading space of this body is: Length 66 inches, width 42 inches and height 62 inches. Extreme length of body including dash 10 feet 21 inches; from dash to frame of seat 27 inches; depth of seat 15 inches; outside width 47 inches and extreme height 5 feet 6 inches. Length of top 10 feet and amount of top from front of seat 2 feet.

The length of the frame is 10 feet 3 inches, width across 36 inches and body rests directly on the frame. Height of body from floor $34\frac{1}{2}$ inches; length of wheel base 7 feet $10\frac{1}{2}$ inches, width of gauge $56\frac{1}{2}$



gether. The front board is lapped over the entire posts and end wood is covered with the moldings on side surfaces.

The moldings on the side of the sills are worked on; if the side boards are 1 inch thick and the moldings $\frac{1}{4}$ inch. The rabbet is made $1\frac{1}{4}$ inches by $\frac{3}{8}$ inch deep, leaving a molding $\frac{1}{4} \times 1\frac{1}{8}$ inches. Into this rabbet these boards are placed and are drawn down by seven strap bolts each side. Between the strap bolts one or two screws are inserted from bottom surface of sills to keep the boards from bulging out.

Another way is to dress the sills $1\frac{1}{2} \times 5$ inches; screw the side boards every four inches, one screw No. 16, $2\frac{1}{4}$ inches long. Put white lead in the joints, making the strongest job. This method has not only a great deal more carrying capacity, but makes it stronger sideways. To keep the boards in position sideways besides the strap bolts are three stays on each side. These stays if the sides are not forced out should be sufficient to hold them in position. The slanting boards are kept in position by the same strap bolts; there are three small ones and four large ones each side; the small ones run up on the inside and turn outward on top under the side board. Four of the large outside stays com-

inches and diameter of wheels $36 \times 2\frac{1}{2}$ or 3 inches, solid rubber tires.

Generally 40 cells, arranged in four separate units of 10 cells each, are used, carried in an underslung compartment under the body between the wheels. The size of this compartment is made to suit the size of the combined 40 cells in length, across and height.

Length of front springs 38 inches; width of plates 2 inches; number of plates six, all No. 2 steel.

Length of rear springs 38 inches; width of plates $2\frac{1}{4}$ inches; number of plates seven, all No. 2 steel.

Body molded as shown, one oval window on each side with stationary glass; two arched moldings on each side on upper part, but the inside lines represent striping. There are three circles and one-half circle each side, $5-16 \times \frac{3}{4}$ inch, connecting with upper and lower moldings. The inside line in the circle is a striping line only to match with the rest of the striping.

While the upper part is divided in two arches and a stationary glass, the lower part is divided into five parts each side, with moldings rounded in the corners, balancing the entire design from upper to lower part, but instead of a single stripe there are two around the square in each part.

The doors in the rear part are hinged to posts and

jointed in the middle and are 6 inches below the top rail, which strengthens the body and withstands the side motion.

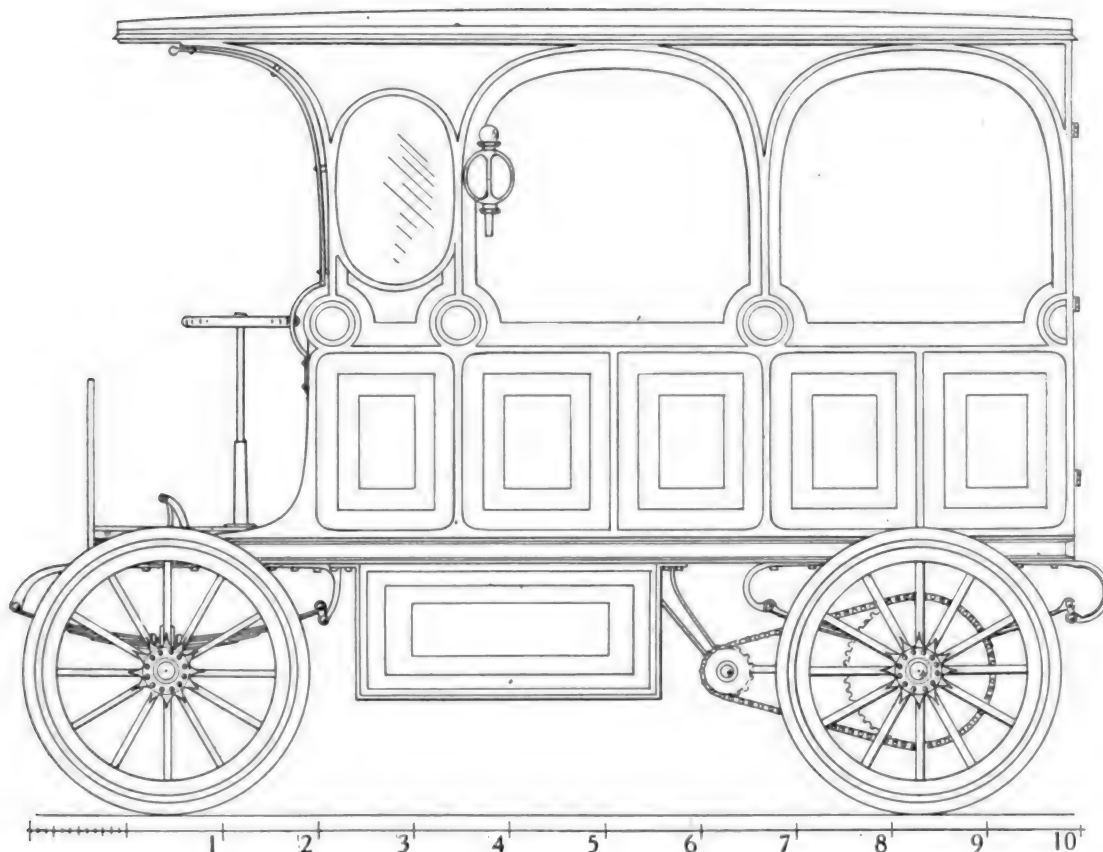
Construction of the Body.

The body rests directly on the frame which is 36 inches wide and its support is on the crossbars, as the sills over all are 4 inches wide only. The double dotted lines lengthwise on the bottom view, also on the back view, show the position of the frame, the body being 47 inches wide, and the frame 36 inches wide, give $5\frac{1}{2}$ inches overhang on each side.

The two side sills and all the crossbars, except the end crossbars are $1\frac{3}{8}$ inches thick, and the end bars

top and bottom, but generally they are not painted at all at the bottom surface.

On the top ends the posts are notched in as usual into the top rails, glued and screwed well from the inside. The top curves are dressed 1 inch square and are directly above the posts and the top is covered entirely with $\frac{1}{4} \times 6$ inch pine boards or $\frac{1}{4} \times 1\frac{1}{2}$ inch strips put close together or with 1 inch or more space between and covered with rubber drill. The side surfaces are covered with $\frac{3}{8}$ or 3-16 inch poplar panels, three for each side, its joints resting on the rails. The rails are generally $\frac{5}{8}$ inch thick, but if paneled on the inside half way up the lower rails are made level with the posts, so that the panel rests against



Electric-driven Store Delivery Car carrying from 1000 to 1200 pounds.

2 inches. The bottom boards are $\frac{5}{8}$ inch thick, rest on sills and bottom crossbars, but are rabbeted into the end bars, making them level on top.

The ten posts, five on each side, are 1 inch square, and the rear corner posts $1\frac{1}{2} \times 3$ inches. If a door rabbet is on the corner posts, or if paneled on inside, the panel is rabbeted into the posts and the panel must be level with it. The door rabbet is generally preferred as it prevents the dust going through the door joints. The posts have short tenons, that is, they do not go through the sills, leaving about $\frac{3}{8}$ inch on bottom; a screw hole is bored through it and posts drawn down to the shoulders of the sills. The objection to post tenons mortised through the sills is that the dampness enters the tenon from the bottom and in time will decay, while with the mortise closed at the bottom surface the tenon is well fitted and white-leaded when screwed down in its place. Thus if the water should enter from the top, the tenon will not decay. Each bottom board has $\frac{1}{8}$ to 3-16 inch opening so that the air or water, if there is any, can go through it. Bottom boards will last twice as long if white-leaded between crossbars and boards and left open between the joints. They should also be painted

the rail. The same is done with the upper rails if paneled clear up.

The seat rails on cross and side rails, and cross rails are mortised into the posts and side rails screwed against the posts. The rear door stock is dressed $\frac{7}{8}$ or 1 inch by $1\frac{3}{4}$ or 2 inches, covered over with $\frac{3}{8}$ or 7-16 inch poplar panels. Such doors should have tenons not capped, if lapped they will warp and will not shut right. The only way to keep them in position is to lock them top and bottom, but this holds good for the left door only; if the right door warps, nothing can be done.

If the rear tires are worn get a new pair for the rear and let the old casings spend their declining days on the front wheels, where the service is easier. You will be money in pocket by so doing.

While some plugs work better with a longer gap than others the same does not apply to magnetos. It is the part of wisdom to adjust the plug according to the instructions furnished by the manufacturer of the magneto.

PAINT AND VARNISH.

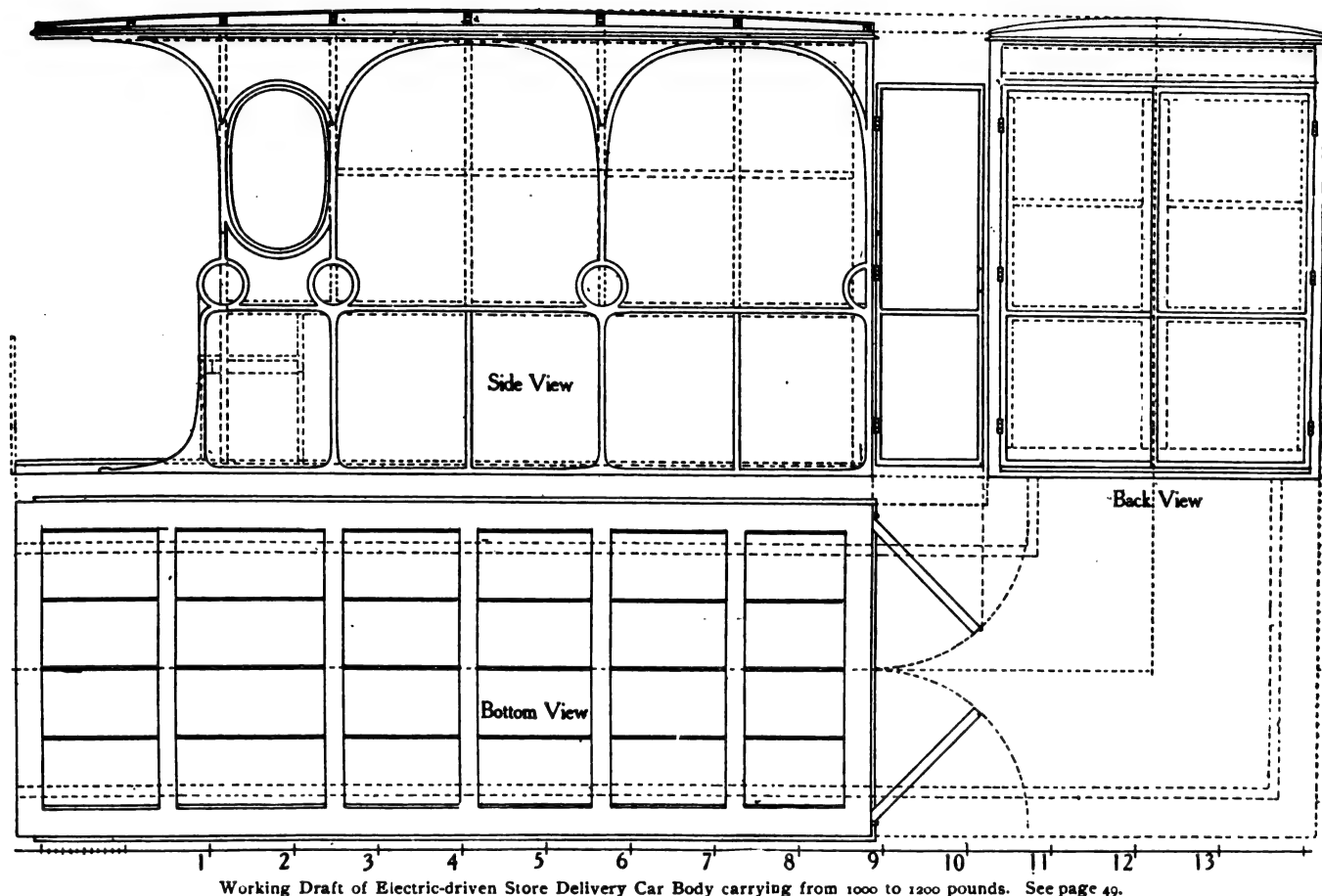
Automobile Painting Practice—Good Materials are the Life of the Finish.

BY M. C. HILLOCK.

Whether the automobile be painted by the professional painter, or by the car owner, or the handy man of the neighborhood, the need of good paints and varnishes is equally urgent. You cannot possibly get away from the fact that the life of the finished surface depends chiefly upon the quality of the material employed. If you put the varnish on thin or heavy the need of quality is the same in both cases.

The advantage of using a cheap varnish simply be-

ties, here manifest themselves. The cheap, inferior color is invariably lacking in tone and lustre and richness, as it is also lacking in those elements which unite to make it durable. Some cheap colors, of course, look well and make a brave show upon the surface for a little while, but as compared to the strong and durable colors they are deficient in the power to retain their original purity of color and they crack and fade and go to pieces early in life. The surfacing coats over which the color and the varnish coats are placed are in the same good measure required to be trustworthy and durable. Whether such coats consist of white lead and other substances prepared at the shop, or represent materials purchased ready to use, matters little. If they are fine and good, and render durable service, they are the cheap-



cause of the price inducement is at best only a temporary one. Such a varnish may shine gloriously for a brief existence, but by reason of inferior composition its brilliancy is short lived and its resources for protection are very soon exhausted. What the car owner needs, and, indeed, what he must have to serve his purpose economically is a varnish of good body, tough in film, fine lustre, rich in flowing and brushing properties, and as reliable as the town clock in drying free from dust and from all the other enemies which doth so easily beset it.

Such a varnish is cheap regardless of the price and it is really the only varnish which the car owner can afford to use.

Good colors for the car are equally important. All colors perhaps in large measure look alike in the mixing pot, but when spread out over the surface and placed under the illuminating power of the varnish, there is a wide variety of difference. It is here that quality counts.

The tone and depth of lustre and general richness of the color, to whatever extent it may possess these quali-

est, ultimately, be the price high or low. And if they are contrary to all this they are dear at any price. It may not be easy for the car owner to always see this, but it will be found true in the last analysis, nevertheless.

In the painting and finishing of the car it is the quality of the materials used which makes the work reasonable or extravagant. All sorts of the best obtainable skill may be employed, and the greatest possible care bestowed upon all the processes, but any little streak of inferiority running through the paints and colors, and varnish, cuts the ground from under the whole fabric and great is the fall thereof.

It is fair to urge, therefore, the urgent need, first of all, of good high grade paint and varnish stock in painting and finishing the car. Personally, we should prefer to have fewer coats in the makeup of the finish, and have them without fault or blemish, than a greater number consisting of cheap, inferior material.

The manner of keeping the paints and colors and varnishes in stock has much to do with their real usefulness

when placed upon the surface. Varnishes should always be kept in a dry, moderately warm room, and where only a small quantity is used from time to time it should be bought in one quart cans. When opened and exposed to the air varnish takes up oxygen and thickens in body and loses in flowing properties.

Colors should be kept in clean, cool shelf room. When the contents of the can of color are exposed to the air they should at once be covered over with turpentine and kept away from the dust. All colors and paints should be maintained in a fresh, clean condition. If allowed to get rancid and fatty and "skin over" they quickly deteriorate and lose in quality.

PAINTS AND VARNISHES.

A Few Points of a Non-Technical Quality That Will Be Interesting to the Car Owner.

BY JAMES F. HOBART, M. E.

Many people, some automobile users included, seem to possess very misty ideas regarding the use of paint and varnish, the proper method of their application, and the manner in which they harden. Right in the beginning, I am going to make a sweeping statement which some persons may find it hard to believe, but which is true, nevertheless, and can be easily proven beyond doubt.

There should be no difference between paint and varnish, except the former consists of linseed oil, turpentine and a pigment, while the latter contains a resin or a gum instead of a pigment, like oxide of lead, zinc, iron or copper. Paint hardens by evaporation of the turpentine—the thinner—and by oxidization of the oil. Only a few oils called "drying oils" have the quality of oxidization.

Linseed oil, which when pure, is extracted from flax seed, is the best "drying oil" except one, in the world. That one is the Chinese "Tong" oil which is even better than linseed, but its scarcity and cost prevents its adoption and use to any considerable extent in this country. But the statistics show that the world's consumption of linseed oil is more than twice its known yearly production, hence its almost universal adulteration, or the substitution altogether of some other oil, for which purposes, more than thirty kinds are known to be available—cottonseed oil being probably most used for this purpose.

As both paint and varnish harden by absorbing oxygen from the atmosphere, it will be seen how necessary it is for the surfaces to be exposed constantly to plenty of fresh, clean air after the painting operation. It also shows why the several coats do not harden readily when shut up in tightly closed rooms. Therefore, ventilation is as necessary for paint rooms as for sleeping rooms.

The hardening of paint and varnish is hastened by the addition of a "dryer" to the oil with which they may be made. Dryers, or "drying oil" consist of linseed oil in which there has been mixed litharge, sugar of lead, oxide of manganese or one or two other oxides used for that purpose. The use of these substances has no effect whatever upon either the soil or the pigment, except that it (the dryer) takes up oxygen from the air, hands over the oxygen to the oil in the paint or varnish, and then immediately takes up another portion of oxygen, and continues in this manner, indefinitely, or until the paint or varnish has become fully oxidized (hardened).

Having once comprehended the manner in which

paint must harden, the automobile man at once sees how very necessary it is that the paint and varnish be applied in very thin and very even coats. As the oxygen taking, can only go on through the surface of the coating, it will be impossible for a thick layer of either paint or varnish to become fully hardened except after a very long exposure to the air. The above shows why the paint, over cracks not properly filled, always proves soft. It also shows why paint which has "run" into streaks and ridges, is not as lasting or durable as evenly spread coatings. The thick layers become oxidized on top, while the paint or varnish is still soft underneath.

In cases of thick coats, the outside becomes hardened while the inner portion is still soft, and upon the sudden application of force, the outside of the layer of paint slips off almost exactly like the bark off a willow twig in whistle-making time. True, the thick coats harden in time, but as the outside hardens, the inside can get oxygen only slower and slower as the outer films loses its power of absorbing and transmitting oxygen, and who will wait three weeks for a thick coat to harden when if applied in three thin coats, it would have hardened in two days each.

Another word of caution! Don't use gasoline in paint or varnish instead of turpentine. The writer is well aware that this is common practice, and he is also well aware that as good a job of painting cannot be done with gasoline as with turpentine. The former flies off almost instantly, even before the paint is well spread under the brush, therefore the coating is rough and does not have time to come as closely in contact with the surface upon which it is spread as when turpentine is used.

Turpentine, as used in paint and varnish, is commonly known as "spirits of turpentine." Its right name is "oil of turpentine." It contains some resin which seems to oxidize partially, and to combine with the oil to form a better coating. There is nothing in gasoline which adds to the value of the paint as turpentine does, and as the latter evaporates slower, it gives the workman a chance to apply the coating much better than is possible with gasoline as a thinner. Therefore, if you want the best possible job of painting on your automobile, do not use gasoline as a thinner.

And to obtain the best paint job, the paint and the varnish must be made up with pure linseed oil. In a paint, the entire value of the coating lies in the oil, for the pigment does not combine with the oil in any way whatever. The lead, zinc, or whatever pigment may be used, simply remains inert in the paint, like a lot of stones in concrete. While the pigment does the trick of providing a wearing surface, it is the oil which holds the pigment in place to take the wear, and holds it there by purely cementive power, the same as glue holds two pieces of wood or cement holds together the pebbles in concrete. But as for any chemical action between the oil and the pigment, there is none whatever any more than there is in a mixture of sand and water. Therefore, for a good paint job, see that the linseed oil is linseed, and not something else.

About the only way of procuring pure linseed oil nowadays, is to press it from the flax seed yourself, or obtain it from some manufacturer whom you can trust. And the manufacturer is not entirely to blame when he gives you cottonseed oil in place of "pure" linseed. He would gladly give a pure linseed oil if he could, but as 400,000,000 gallons of "linseed" oil were consumed last year, according to statistics issued by

the Government, and as said Government reports show a production of only 250,000,000 gallons during the same year, it is easy to understand that "pure linseed oil" must necessarily be scarcer than the proverbial hens' teeth, or white blackbirds. And the reasons may be found above why your automobile don't seem to hold its paint and varnish in good condition any more—why it needs repainting about as fast as you can paint it, and why the varnish coat goes as soon as a greasy rag or a bit of grit comes in contact therewith.

As shown in the preceding paragraphs, there is no union between the oil and the pigment, in paint. The particles which form the "body" of paint, lie as inert as plums in a pudding. But in varnish, it is different. There, a real union takes place between the oil and the resins of which good varnish is made. In varnish, the union between the oil and the resin is about like the one between sugar and water. The resins are actually dissolved and will not settle to the bottom when the varnish remains without stirring for a long time. The above shows the difference between a varnish and a paint. The former is only a coating of metallic oxides cemented to the surface of wood or metal by means of an oxidized oil, while the varnish is an actual solution of resins in oil, the oxidization of which is felt by the resins, which in themselves, actually oxidize to a certain extent, and therefore become actual cementing mediums themselves.

The above shows why some paints rub off as the oil binder is disintegrated by chemical vapors, while the varnish remains intact until actually worn off by friction. To be sure, many chemical vapors will destroy varnish. The automobile man should take care that his machine is not exposed to the vapor from ammonia. That substance will raise the dickens with varnish about as quickly as any other known chemical. Indeed, one of the best varnish removers known to the trade is a mixture containing strong ammonia. This mixture is to be thickly spread over the surface to be treated and in thirty to fifty minutes, the entire coat of varnish may be lifted and scraped off, in a jelly-like state.

The above shows why a certain manufacturer of ice complained that he could not keep varnish on his car. He "called" the manufacturer for using "bum" varnish, when the only fault was that the car was placed daytimes in a garage where the fumes of ammonia from the ice-plant filled the room. It was not to be wondered at that the varnish quickly left that automobile.

Another case of varnish trouble was brought forward by a farmer. The varnish seemed to disappear about as quickly as from the ice-man's machine. Upon investigating, it was found that the farmer kept his car in a close room in the stable, in which the fumes of ammonia were very prominent at all times. This time, the ammonia came from a large amount of horse manure which was allowed to accumulate in a basement cellar so situated that the fumes found their way to the garage—and stayed there! The rearrangement of the automobile room and the stable, resulted in cutting the ammonia fumes out of the garage and the farmer had no more trouble with varnish.

The paragraphs presented above show how varnish may be affected by chemical fumes in a manner unsuspected by the person who is not posted in such matters. It should always be the policy of an automobile owner, when paint or varnish goes bad, to at

once investigate the matter fully. There is no effect without a cause—and sometimes several of them—and if the owner of a car is unable to find the trouble, then by all means call in someone who is acquainted with the matters which are giving trouble. A little consulting often pays mighty big dividends upon the capital invested. A few words regarding the nature of varnishes and the best materials therefor, and then a few receipts for good varnishes and paints for particular situations:

Varnishes are as stated, made up of linseed oil, turpentine and a resin. At least all the best varnishes are made therefrom. But, alas, some cheap varnishes, and some inferior ones which are far from cheap, are made up without one particle of the above named substances being contained therein. It is a fact, that some cheap varnishes do not contain one particle of linseed oil, turpentine or resin! Instead of linseed oil, cottonseed oil is perhaps used, while gasoline takes the place of turpentine and one or more gums are used instead of a resin.

There seems to be some misunderstanding or confusion as to just which are gums and which are resins. It is very easy to tell one from the other. All the resins will dissolve in turpentine or gasoline and many of the gums will also dissolve in those liquids, but no true resin will dissolve in water. The gums will dissolve in water, but not the resins, although a few will partially dissolve in water, but it is evident that those are not true resins, or are mixed with resins to some extent.

Gum arabic is a fine example of a gum. It will dissolve readily in water, and a varnish may be made from it but it is of little use except for the photographer who may use it for varnishing negatives which are to be retouched. The very best resin, also the most expensive, is amber. This substance is a fossil resin which has laid in the earth for ages. A varnish made from this substance, with pure linseed oil and oil of turpentine cannot be surpassed by any other in the world.

The best varnishes sold by the trade are those made from copal and damar and are second only to amber, but far from being its equal. The cheap varnishes contain sandarach and rosin. By "rosin" is understood that particular resin obtained by distilling turpentine to obtain the oil of turpentine with which all good varnish should be thinned. All the varnish materials are "resins" but the particular resin obtained from the pine tree is known as "rosin." A varnish made from this substance must necessarily be brittle and easily damaged by rough handling. Rosin varnish is a first rate protection from the weather, but anything covered with that kind of varnish, should be placed inside a glass case to prevent its being handled, for rosin varnish won't stand handling.

Rosin being comparatively cheap, it is used with a little copal or damar to reduce cost and the value of the resulting varnish for automobile purposes depends upon the quantity of rosin used with the better resins—the less rosin, the better the varnish. Sometimes such varnishes are "doctored" by using with the rosin, a portion of caoutchouc, but as with the other varnishes, the less rosin the better the varnish.

A fine varnish for automobile purposes, and one which will withstand the application of hot water—even boiling water—is as follows: but the writer has not tested this varnish and gives the receipt as it was given to him, and the varnish must be tried and accepted upon its merits:

Boil three pounds of linseed oil (raw oil) in an untinned copper vessel and suspend in the vessel, so it will not touch the bottom or sides, but will be immersed in the oil, a muslin bag containing five ounces each of powdered litharge, minium and white lead. Boil the oil for several hours until it takes on a deep brown color. Meanwhile, in another vessel, over a very hot fire, dissolve two pounds of amber in four ounces of linseed oil. When the amber is all dissolved, and the other oil deep colored, pour the amber solution into the oil and boil a few minutes longer, stirring well and continuously to obtain a perfect mixture of the oil and amber.

Before removing from the fire, some makers attempt to clarify the mixture by adding a few cloves and boiling again, then adding more cloves and boiling a few minutes longer, repeating as may be thought necessary. Some people use garlic instead of cloves. Keep the varnish in closely stopped cans and before using, give the wood a coat of lampblack dissolved into a very thin body with oil (spirits) of turpentine. After the coat above mentioned is dry, and has been well rubbed down, apply the hot water varnish thinly. Unlike other varnishes, this kind may be well rubbed over the surface, and may be applied with a sponge instead of a brush, if desired. Spread the varnish very thin and evenly, and apply at least four coats, drying each one well before applying another.

After the last coat has been applied, heat the object in an oven if possible. In case of an automobile, enclose it as much as possible and make the room just as hot as you can—hot as an oven—if possible, and maintain the heat several hours. Then, polish the varnished surface and you will have a varnish coat on your automobile which will be the envy of everybody on the road, and which will stand almost anything in the way of rough usage, including washing with boiling water and similar usage. But this varnish will not stand being hit by a locomotive or rubbed with sand paper!

But the Editor says, "cut it out," and with a paint receipt, good for use on hot metals, like engine and exhaust pipe, the author will declutch and cut off the spark. The best hot-metal paint, in the estimation of one automobile user, at least, is the silica-graphite paint of commerce, thinned with pure boiled linseed oil, and nothing more added.

Another mighty good hot metal paint may be obtained by adding to some of the hot water varnish described above, as much powdered soapstone as necessary to give body to the varnish, thus actually making it into a paint.

It is claimed that the soapstone will give iron or steel the appearance of enameled surfaces, fine grained, durable, and not affected by heat, acids or the action of the atmosphere. Takes hold of the fiber of iron or steel readily—something which cannot be said of many paints used upon metals.

The silica graphite paint can be had in one color only—black—while the soapstone business may be tinted any desired color by the use of metallic oxides, and that too, without losing much of its fire and heat-proof qualities. A good deal has been said against the use of graphite paints, and beyond all doubt, graphite is not desirable where the metal painted with graphite is exposed to the weather as is the case with roofs, etc. But for automobile work, there would not be the objection that corrosion takes place underneath while the outer surface of graphite paint is perfect and seemingly protecting the metal

perfectly. All in all, carbon in a pure state, is seemingly a better paint substance than graphite.

The writer will be pleased to answer to the best of his ability any and all questions relating to painting and varnishing, and questions which he cannot answer personally, will be taken to "The man higher up."

Exhaustive Tests.

The research department of General Motors Company is undoubtedly one of the most exhaustive institutions of its kind to be found in any automobile organization in the world. A modern definition for this department would be "A physician who keeps the product of a company in a healthy condition and free from flaws," for that is what it really does. It tests everything, no matter what it is or how trivial—the smallest and the largest items alike are carefully analyzed; and the director of research, Claude E. Cox, will, if you ask him, give you the pedigree of an axle for a five-ton truck or the ingredients making up a harmless looking grease.

The functions of this department are many and important. It must first of all keep in touch with modern engineering methods; it must know the prevailing practice in motor car construction in this country and abroad. It must know the good and the bad, and it must give its reasons for it. The "because" of a certain thing won't go. A visit to this chemical laboratory is really educational, for one is surprised to learn the many thousands of dollars spent each year in experimenting and perfecting machinery. You will see testing machines having the strength to pull apart a piece of steel that would support a hundred-ton load. You look at it with the feeling that you would trust your life in a five-passenger touring car equipped with an axle that had undergone this severe test.

If Short of Gasoline.

If you run short of gasoline in a locality where the supply cannot be replenished easily, you can often get home without difficulty by mixing ordinary stove naphtha or even kerosene with the fuel remaining in your tank. Of course, the carburetor will need adjustment and the main thing to remember is to keep the engine running constantly and keep it hot, so as to vaporize the mixture readily. Extreme care should be taken when filling the gasoline tank, and the poorer grade of kerosene or gasoline, if used, should be well strained.

Car Tracks Injure Tires.

The number of drivers operating cars so that the tires are run carefully upon the street car rails do not seem to realize the harmful results. The fine particles of steel which are constantly worn from the rails and the sharp edges of the guard rails upon turns will shorten the life of the average tire to a great extent, as the tires are damaged by these fully as much as by sharp sticks and stones.

Second-Hand Cars.

It is known that the average life of a good automobile is 100,000 miles. Few cars get more than 10,000 miles of service in a year. So it can be figured out how, as a matter of economy, an automobile from last season or the season before, sold at from 40 to 60 per cent. of its original cost, is a wise investment.

Radiator leaks are often caused by steam which, unable to escape through clogged up filling cap, forces its way out through weak places in the radiator. The prevention is to keep the cap vents open.

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THE BEST STIMULANT.

There may be an excuse for a man to take a drink if he has been toiling for ten long hours in a shop or factory, or even in the case of one who has applied himself to mental effort alone for that number of hours. An exhausted body or brain often needs a tonic, although alcoholic beverages are probably the most dangerous that one can indulge in.

But driving an automobile or riding in one is at once the best and most effective stimulant one can indulge in. Nothing more is needed. But if to this exuberance of feeling there be added the influence of a "highball" or two, recklessness is sure to follow. Moreover, the man who takes only an occasional drink is more likely to be reckless than one who drinks steadily.

The automobile ought to be the greatest spur to temperance and to total abstinence that has ever appeared. There are a good many reasons why the rider in a car and the driver of a car should be total abstainers and not a single reason why they should not be.

Garage keepers and car owners would do well to insist that no one shall drive a car for them unless he shall be a total abstainer from alcoholic liquors. The lack of such stimulants cannot be much of a deprivation for those who follow such a calling, and the indulgence in them can result in nothing but physical and mental injury.

VARNISHES AND LACQUERS.

Frequently some reader makes an inquiry for a formula to restore the lustre of varnish or to lacquer metal parts of the car. It goes without saying that we can give formulas for such purposes, but invariably it would be more satisfactory to buy the preparations already compounded. Manufacturers of such

preparations spend a good deal of money and time to produce something of the highest merit, and no home-made article is as good as that which can be purchased.

It can hardly be expected that we can test all the formulas that this or that person or book of formulas recommends. Nor can we always guarantee with confidence that the preparations advertised will do all that a reader may anticipate. Lacquers for metal or polishes for wood are put on by experts who do nothing else, and the treatment received is of a kind that cannot be done after the material has been put on the car. Take the case of leather dressing, for illustration, which is usually dyed in by a chemical process, wherein heat and dipping or boiling may be employed; it is not to be supposed that anything applied with a brush or otherwise on the surface will be as lasting or effective.

Body varnish, and leather or metal polish, may be improved by varnish or lacquer, but they can never be made to look as well as when they come from the factory. They can be improved, however, and this may best be accomplished, not by the use of some home mixed preparation, but by that which is made by some manufacturer who has spent a good deal of time and money to secure that which gives the best results.

THINGS AMERICAN.

There is nothing about an automobile that may not be as well expressed in English as in French. We may be a bit old-fashioned, but it seems as if the word driver would answer as well as "chauffeur," the words running gear as well as the word "chassis," and the word body as well as the word "tonneau."

The matter is not vital or momentous, but a good rule to follow is to use no foreign word where there is an English equivalent. It is sometimes convenient if not absolutely necessary to draw upon the French language for certain terms in relation to the fine arts and in cooking; possibly likewise, for dress, since there are no English words that mean the same, but in no other instances. As to the claim that the French language is better for diplomacy or polite society, there is not much to it.

What we want to see is the American people just as loyal to their Americanism as the French are to their Frenchism, or the English to their Englishism, and then let us see that we have just as much reason to be proud of it.

We have nothing against the French or the English; indeed, they have some splendid qualities of mind and manner which we Americans may well cultivate, and among them are their pride and loyalty for things French and for things English. Let us be as proud of things American and make things American worthy of our pride.

VACATION TIME.

Just a word to suggest to our readers how they may most enjoy the vacations which many of them are now preparing for. Don't be on the lookout for neglect, discomfort, or affront. Don't be too zealous to get your money's worth.

We have a friend with whom it is a delight to travel or go with upon an outing. He never worries over bad roads; he does not care whether we stop here or go there; he never wishes we had done something or gone somewhere we did not; he never complains about food,

bed or price; he never tries to give someone "as good as he sent;" he never loses his patience at a blow-out, if the motor will not "mote," or when an on-coming car does not give quite half of the road; he has a good eye for beauty and a rather careless eye for blemish; he does not worry with the fear he may not be getting all that is coming to him.

But he is companionable, and easy, and quiet, and courteous. Looked at purely from the material standpoint, he may not get all that is his due. Indeed, we are afraid he often gets imposed upon. But in the broader and ethical sense or claim that we can only get out of the world what we put into it, he gets about as much out of life as any one we know.

CARS FOR HIRE.

Although automobile liveries are to some extent displacing horse liveries, this process will not go on very rapidly as long as the price for the use of the automobile is so much greater than that of the horse. It is of course a decided advantage to make a trip quickly and comfortably, but most people will prefer the old way of taking a trip of a given distance with a horse and carriage if they are obliged to pay double or triple for the use of an automobile. One reason for this is the fact that at present cars are not let out unless accompanied by a driver. Few travelling men or those who have occasion to hire a car are able to handle it properly, and some of them cannot be depended upon to give it good care and return it to the garage in good condition. Of course the use of a car by the day should be at least three or four times the cost of a horse-drawn vehicle, as it can go three or four times as far and carry a far heavier load.

However this may be, there is a good business in many localities for those who put in a stock of cars especially for livery purposes. In places where the roads are fairly good in the outlying districts, there are already more automobiles in demand than can be supplied, and the garage keepers are increasing their stock of cars for renting purposes.

ILL-TIMED COMPLAINTS.

Speaking of the high cost of living and its relation to trusts and monopolies, no consumer has a right to find fault with conditions unless it is in the case where there is a monopoly in production.

Just now the beef trust is being pummeled by the public prints. It is not the purpose here to discuss how much of this criticism is just and how much unjust, but the other day the writer rode in an automobile through northwestern Connecticut and southwestern Massachusetts. He found thousands of acres of abandoned farms there that were fairly well adapted to grazing purposes. Now there is absolutely nothing to hinder any one with a few hundred dollars going up there and raising beef for the market. The land can be purchased for from \$2 to \$10 per acre, and that which is covered with a growth of wood can be cleared at a profit, while we were shown one field of good grazing which had been effectively cleared of a brush growth by a flock of Angora goats.

Difficulties in the way? Yes, there are difficulties in the way of anything. We have no space, nor is this the place to go into details. But the facts are as stated, and it is rather exasperating to hear too much about the high cost of living when within 100 miles of New York City there are abandoned farms that can be had for a song.

A shortage of production is always the cause of

high prices, but when that shortage of production is largely due to a lack of effort to increase it, complaints are rather ill-timed.

THINGS TO CONSIDER.

Some of our readers seem to feel that light weight in an automobile has all the advantages. This is not quite the fact. That it has a majority of advantages must be readily admitted, but the heavy car has also some desirable qualities. It is not so affected by small obstacles in the road; it moves more smoothly; it rides easier; it is not affected so much by wind resistance.

On the other hand, while the cost per running mile is greater for the heavier car and load, the cost per passenger is less in the five passenger touring car than in the two passenger runabout. Neither does it respond so quickly to the throttle, nor accelerate or retard so quickly.

After all, the main thing to consider in buying a car is the use it is to be put, the roads it is to be driven on, the finances of the purchaser, and the reliability of the maker. Although the price is one of the main considerations to most of us, we are inclined to believe that there are more regrets because of purchasing a low priced car than a high priced one. Here again extremes may well be avoided.

It is well to consider likewise that the cost of labor for manufacturing and assembling a car made of the best material cannot be much if any more than in the case of one of poor material.

DREW 80,000 SPECTATORS.

One of our "esteemed contemporaries," speaking of the recent Indianapolis race, says: "There is too much deception employed by makers who compete in non-stock events." Quite right—if there be any deception at all.

As a spectacle to draw the crowd at fifty cents or a dollar a head, these non-stock car races are a greater success than a contest between the two baseball league champions, but beyond this they are of little consequence. This one drew 80,000 spectators, the largest number that ever gathered at a paid sporting event in the world's history. It is said that the Colosseum at Rome provided seats for 87,000, but we never could see where they put them.

One gratifying thing about this race was that beyond the usual smashing of tires, rims, connecting rods, etc., nothing else was smashed but time records, and these went down before the heroic drivers like "toy soldiers." But when one begins to draw conclusions from the order of finish, he at once becomes bewildered with facts that were largely controlled by chance.

WORM DRIVES.

Disguise it as we may, the best drive for the transmission of power is a well-designed chain. The next is a cog gear drive with the proper pitch of the teeth, and the third best is the worm drive. This last would not be worth considering, however, were it not for its silence and smooth running, as well as for the fact that it allows a great reduction in ratio without the use of large size gears.

But the worm drive is caused by sliding surfaces, and as such the friction must be considerable, and this must increase in a somewhat progressive ratio to the increase of the applied power.

Worm drives are attractive for their smooth and silent running, but as power transmitters they are handicapped by their friction.

LESSONS FOR DRIVERS.

Carelessness and Ignorance Responsible for Most Accidents.

Judging from the newspapers, the feeling against careless automobile drivers seems to be intensified, not only in this country but in Europe. In England, measures are being taken to secure greater detail in reports of automobile accidents. These amplified statistics, it is thought, may give information so that it will be easy to supply a remedy. The police and other officers are now required to give the number of fatal accidents in which the drivers are not to blame, the number in which they are considered blameworthy, the number of children killed, and the number of accidents at night and full particulars otherwise. It is a terrible thing to have caused the death of a fellow creature, and frequently the driver of the car is blamed when the accident was through no fault of his own. In some cases the victim is guilty of gross negligence or stupidity, and pedestrians take as many chances and are quite as reckless in many instances, as drivers of automobiles themselves. Not long ago a school teacher was run down and killed near this city and the driver states that he saw her ahead when she first attempted to cross the street. He assumed, of course, that she would keep right on and prepared himself accordingly. No sooner had she reached the middle of the street, however, than she dodged back and the driver immediately wheeled his car to pass in front of her. She then dodged the other way and although his car was going at a moderate speed, he found it absolutely impossible to avoid striking her.

In Great Britain during the year 1911, there were 1557 fatal vehicle accidents. Of these something like two-thirds were caused by automobiles. Of the non-fatal accidents the proportion due to automobiles was something less, but as the entire number was nearly 34,000, it is easy to see that public apprehension is at a high point there and no doubt something drastic will be done to make the highways more safe. In this country there seems to be more accidents reported than usual this month, but we have room only for a few:

Seven Persons Hurled Into River.—In Chicago a chauffeur took a car out without authority and invited several young women to take a ride with him. The end of the tour came between two and three o'clock in the morning when in South Chicago, not knowing that a draw was open the car was run off a bridge and into the river. The car was going at a high speed, but the driver apparently had reversed his power. It thus skidded and turned over before going into the water. The bodies of the victims were recovered the next day.

Car Over-Turned.—Near Everett, Washington, a car being driven rapidly, rolled over on its side, throwing two men out and dropping squarely on them. One of the passengers suffered a good many broken bones, and the other had his hip crushed. It is doubtful if either survive. The accident occurred while rounding a curve in the road.

On the Wrong Side of the Street.—In Chicago a 60 h.p. car driven at the rate of 30 miles an hour, in order to allow a passenger to catch a train, swerved to the wrong side of the street, killing a woman almost instantly. The driver of the car was experienced and had been nearly ten years at the business, but he evidently had either lost his head or was making so much haste in a somewhat crowded street that it was impossible to avoid his victim. He was arrested and will probably be punished.

Hurled to Instant Death.—A most shocking accident occurred near Roanoke, Va., in the evening when an automobile driver lost control of his car and it left the road and smashed into a fence which was set in concrete. The machine was wrecked, two persons were killed and two injured. About all that can be said of this sad affair is that the car was going at too high a rate of speed and skidded at a turn in the road.

Hurled Through a Wind Shield.—Near Albany, New York, a car with four passengers, two women and two men, which was being demonstrated, struck a telegraph pole and turned over in a ditch. It caught fire, and although an attempt was made to extinguish the flames at once, it was destroyed. According to reports in the newspapers, the front wheels of the car spread suddenly, and the car swerved and struck a telegraph pole, and the driver was thrown through the heavy glass of the wind shield. He suffered severe bruises and cuts.

Result of a Bursted Tire.—Three men were thrown over a 70 foot embankment at Millers Grove, Pa., when their car dashed off the highway. The fourth member of the party saved himself by grasping the fence at the top of the embankment. The car was being driven at a fast speed around a turn in the road when one of the front tires blew out and the car went down a steep embankment 70 feet below. Strange to say nobody was killed but all were severely injured.

Result of a Joy Ride.—Four persons were injured, one of them a woman so badly that she will be crippled for life, when a car crashed into an iron pole in Philadelphia. The car was a big \$11,000 Mercedes and was pretty well demolished. It is stated that the driver lost his grip on the steering wheel and the car swerved sharply to one side. Before it could be righted, it ran into the iron pole.

Death Due to Mother's Call.—A child five or six years old was run down and fatally injured in Rochester, N. Y., owing to his attention to the call of his mother. He started to cross the street when she called to him to stop, probably fearing that he would be run over by an oncoming automobile. The little fellow became confused and was hurled to the pavement and his skull crushed.

Result of a Tire Explosion.—Near Reading, Pa., a man was driving at a rapid rate when his rear tire exploded and the machine swerved. Then the steering gear snapped and the car with its helpless driver was dashed down a hill and overturned at an embankment. Soon the wreck caught fire. The driver escaped with his life, although at last accounts, he was in a hospital.

Dangerous Ruts in the Road.—Two men were in a car a short distance from Shoemakersville, Pa., when they were thrown off their course by deep ruts in the road and collided with a telegraph pole. The pole was snapped off three feet above the ground and the car was completely destroyed. Both the passengers had to be taken to their homes and one of them may possibly carry the results of his injury as long as he lives.

Result of a Coming Storm.—While driving on the banks of the Allegheny River, near Warren, Pa., five persons were sent over an embankment owing to the breaking of the steering wheel. It appears the party was speeding rapidly to get ahead of a thunder storm. One of the victims had a broken back and the other suffered internal injuries, which may cause her death, and all were badly cut and bruised.

Two Cars in Collision.—Near Chittenango, N. Y., a big touring car tried to pass between two other cars. There was not sufficient room, however, and

one of the rear wheels struck the car, turning it completely about and tipping it over a ten-foot embankment. The three passengers were thrown clear of the wreckage. Two unconscious women were picked up. One person was probably fatally injured and the entire five in the car received injuries which will prevent them from doing any more automobiling for some time to come.

Car Overturned.—At Fredericksburg, Texas, a man was seriously injured when his car skidded over a bluff on the bank of a river. It overturned and the driver was caught under it. Fortunately, however, the steering wheel protected him and he escaped with only a very badly bruised face and eye, and other injuries which may prove more serious than he thought at that time. The automobile was wrecked.

Over His Own Child.—In Islip, L. I., New York, an infant son fell under his father's automobile while he was backing it out of the yard. The car was finally stopped but the child was held down by one of the rear wheels. Singularly enough, owing to the soft ground or something else, the child is still alive.

Breaks Its Occupant's Neck.—In Rockford, Ill., a man had his neck broken, while a woman in the same car was seriously injured, when it turned turtle, owing to careless driving. Others of the party were likewise slightly injured.

The Unlucky Thirteen.—In New York City, a heavy automobile which is said to be number thirteen, killed a man Monday and injured two girls the next day. Although the press reports emphasize the number of the car, ordinary individuals would emphasize the carelessness of the drivers.

Skidded Down a Bank.—Near Little Rock, Ark., a car was entirely demolished by sliding down a steep embankment. The accident is said to have been caused by the glare of the lights of another approaching automobile. The driver was not able to distinguish the roadway and turned off the road and down this embankment. No one seems to have been seriously injured, but the car itself was a total loss.

The Steering Gear Failed.—In Philadelphia, near midnight, four persons were seriously injured and two were taken to the hospital as a result of a defective steering gear. In some way it failed to work when needed, and the car turned to the pavement and ran into an electric light pole.

Run Over by His Own Car.—A man at Plainfield, N. J., was at last accounts suffering from injuries received when he was run over by his own automobile. The car was stopped at a hotel, and the owner forgot to throw the clutch out. When he cranked the car to leave for home, it of course bounded ahead, knocking him down and passing over him. The car ran a half a block and crashed into an electric light pole and was pretty well damaged.

Struck by a Trolley Car.—In Paterson, N. J., a party were in a large touring car and about to cross the trolley car tracks when the automobile was struck, the motorman stating afterwards that he had no time to lower his speed. The car was overturned and its six occupants all hurled out. Some of them received slight bruises but one woman landed on her head and received a fracture of the skull. The passengers in the trolley were thrown down and injured. The motorman was arrested but afterwards paroled, as he says he tapped his gong, but the man who drove the automobile states that he did not hear it.

ACETYLENE BURNERS.

Two Kinds and Different Qualities and Other Information for Users.

From O. H. Hampton, Indiana.—There are two kinds of acetylene burners, the two arm and the armless. There are a dozen different styles of the arm burners, and half a dozen different qualities and prices, and it may be as well said right here that there are two kinds of dealers who hand them out to the car owners, the honest and the dishonest. Of these something may be said later.

The arm burner consists of two arms extending upward at a 45 degree angle from the top of the pillar. The gas exit holes in the arms are bored at such an angle that the gas jets from the two arms strike each other at a right angle, thereby spreading the flame and making it one flat instead of two round flames. If the gas outlet holes are bored true so the gas jets strike the center of each other, and the gas pressure is just right, a symmetrical flat flame is made, but these holes are very small, and there is always more or less lime dust coming along with the gas, and as the proper pressure for the best lighting results is quite low, a particle of dust is liable to stick to the side of the hole and deflect the jet of gas coming from that hole so the two jets fail to hit each other. The result is that instead of a flat flame giving a good light, there are two small long jets crossing each other at right angles, and giving a poor light. If the burner be set, as it usually is and should be, so the flat side of the flame is to the front, one of these long slim jets is pointing back toward the reflector and acting a good deal like a blow pipe, sometimes heating it to a damaging extent.

Not only are the gas orifices liable to get obstructed by lime dust, but if the gas pressure gets too low so the gas is not properly burned, there will be carbon deposited about the mouth of the gas orifices which will deflect the course of the gas jets. There is also an oily product which saturates the carbon and if the lava tips are porous this deposit is absorbed, and when the lava gets saturated the burner might just as well be discarded for it will never more be any good.

These burners are not so bad to take care of when used with compressed gas, because a proper pressure can always be maintained, and the burners can sometimes be cleaned of obstructions by allowing a strong pressure for a few seconds. Usually, however, if the burner is made from a poor quality of lava (which, by the way, is really soapstone) the burners do not last long. They are in fact so short lived and so uncertain that the prudent motorist carries some extra ones in his tool box. Tips made from lava imported from Germany are non-porous, and without a tendency to crumple when exposed to heat.

Armless two hole burners have been made for a good many years. They give a splendid light, but are short lived, and are almost impossible to clean so as to be of further use. They are not fit for motor headlight use.

Armless one hole burners have been made for a number of years, and are still used to a considerable extent where a small amount of light is needed. They are not at all suited for motor head lights, because they do not give enough light. They give a candle shaped flame. A very few years ago an American inventor succeeded in making an armless burner that gave a beautiful flat flame, and seldom, if ever, got out of order. It is a one hole burner, and the secret

of the flat flame from a single hole appears to be sawing a slot in the top of the tip, which somehow spreads the flame. It spreads it to a greater width than any two arm burner, which of course makes it a more showy burner, and one that gives more light from the same amount of gas as the gas and air mixture is better. The advantages of such a burner are obvious. There being but one gas orifice it is of course, twice as large as the hole in the arm burner of equal capacity, and is, therefore, much less likely to be clogged with lime dust or carbon. A forked jet is impossible. There can never be a long single jet thrown back against the reflector, spoiling the silvering. This burner never needs any cleaning except sometimes to brush out the slot with an old tooth brush. One of these burners has been in use every night in the writer's dwelling for three years, and has never even needed a rub with the old tooth brush. It is just as good as new.

There is another point to be noted in favor of the armless burner for headlight use. Whatever is placed in front of a reflector cuts off that much of the light. Getting rid of the arms removes that much of the obstruction.

While it is a fact that the flat flame armless burner is without a competitor, it is also a fact that comparatively few are in use, or rather have not been in use until recently. Why? Because the car owners have paid no attention to the matter. When a burner goes bad, the car owner goes to the dealer and says: "I want a couple of burners," gets them, pays for them and goes his way.

Now we come to the matter of the honest and the dishonest dealer. The honest dealer keeps such goods as are most called for. It is easier to keep and sell what people want than to educate customers to want what they need. But if the dealer is really shrewd he looks ahead of today and takes care to advise people as to the best goods and in that way build up permanent trade.

As to the dishonest dealer, a single incident that came under the writer's observation will illustrate. He happened to be in a dealer's store when a customer came in, and said, "Give me a pair of burners."

"All right."

"How much?"

"Fifty cents a piece."

"What's the matter with these burners, any way? I have to get a new pair about every week."

"Blamed if I know," said the dealer. "Guess they're all that way. They are not guaranteed to us, so we can't guarantee them to our customers. I wish we didn't have to keep them. There is nothing in it for us." The customer went away and probably gave the matter no further thought. The writer happens to know that the burners that dealer sold for 50 cents each cost him but \$5 per gross.

It is right that a man should suffer the consequences of his neglecting to inform himself, but it is not up to a dealer to take advantage of the customer's ignorance. Neither is it good business for the dealer to misrepresent the quality of the goods he sells, nor the cost of them. Some day that customer will "get next" to the good burners, and what those burners he paid 50 cents each for cost the dealer, then that customer will relieve that dealer from the profitless (?) handling of burners and quite likely from selling him anything else.

Subscribe for The Automobile Dealer and Repairer.

The 500 Mile Race.

We assume that in the case of any event like the recent Indianapolis 500 mile race, those of our readers who are at all interested have had the opportunity to get all the information they wish of the details in the daily press. The race was attended by 80,000 spectators, and the following table of the first ten who finished out of 29 entries may be of interest as well as a table of what caused 14 cars to retire.

ORDER OF FINISH.

Position.	Car and Driver.	Time.	Miles Per Hour.	Price
1—	National Dawson	6:21:06	78.72	\$20,000
2—	Fiat, Tetzlaff	6:31:29	76.75	10,000
3—	Mercer, Hughes	6:33:09	76.13	5,000
4—	Stutz, Merz	6:34:40	76.0	3,000
5—	Schacht, H. Endicott.....	6:46:28.2	74.25	2,500
6—	Stutz, Zengel	6:50:28.4	73.83	2,000
7—	White, Jenkins	6:52:38.4	73.25	1,500
8—	Lozier, Horan	6:59:38	71.50	1,400
9—	National, Wilcox	7:11:30.4	69.3	1,300
10—	Knox, Mulford	8:53:00	56.28	1,200

WHY 14 CARS WERE RETIRED.

Car and Driver.	Lap.	Cause.
Mercedes, De Palma	198..	Broke piston.
Cutting, Burman	157..	Threw two rear tires, machine turned turtle.
Lozier, Matson	110..	Broke crank shaft.
Simplex, Dingley	116..	Pushed piston rod through crank case.
Mercedes, Wishart	82..	Broke water line connection.
Stutz, Anderson	80..	Broke rear wheel, turning over.
Marquette-Buick, Liesaw	72..	Car set afire by carburetor.
Case, Disbrow	67..	Sheared differential pin.
McFarland, Marquette	63..	Broke right wheels in rounding curve.
Case, Hearne	55..	Burned out crank shaft bearing.
Firestone-Columbus, Rickenbacher...	43..	Intake valve trouble.
National, Bruce-Brown	25..	Valve trouble.
Opel, Ormsby	7..	Burned out connecting rod.
Lexington, Knight	6..	Engine trouble.

Wood or Wire Wheels.

From Harry W. Forbes, California.—In the April issue just received, I note your editorial headed, "Wire Wheel Advantages," contains this statement: "There is nothing that will so tend to cause an automobile to propel 'dead' and hard as heavy wheels. Extra weight in the car or on any other portion of the car is scarcely perceptible compared to the extra weight in the wheels."

This statement surprises me and seems at variance with my experience. I am driving a two passenger Ford roadster, which I had equipped with Firestone demountable rims. This increased the weight in the wheels decidedly, but I am quite unable to notice that it has in any way altered the high climbing ability or the ready acceleration on starting. I live at the top of a two mile hill, having a grade varying from 6 to 11 per cent. and a winding road. I climb this with the same ease on the hill that I did before I changed the wheels. If, however, I add a hundred pounds weight on the car I notice a distinct difference in the pulling power of the car. If you can give me any further light on this question it will be appreciated.

Reply.—In relation to the foregoing, in the absence of any proof save that of mere observation, we must still hold to our opinion as to the locality of weight and its effect on the power of propulsion. Or in other words, so many other varying conditions may have existed in the

tests made, that we cannot accept them as conclusive in the face of tests made where other results were obtained. For instance, the car itself might be in slightly better tune when the last tests referred to were made, or the tires might be lighter or better, or in better condition. We have tried heavy tires and light tires on the same grade and have invariably found the hill climbing ability better with the light tires.

This idea of weight became firmly fixed in the mind of the writer in the old bicycle days, when heavy tires or rims would manifestly cause the wheels to push up a hill much harder than with light tires or rims. On the contrary, a few pounds carried in one's pocket or on the handle bars made no perceptible difference in the propulsion.

However, we have no opinions we are not willing to have substituted by the truth and the facts. and Mr. Forbes is thanked for his courteous favor.

AIR-COOLED ENGINES.

A Few Words in Their Favor from the Dean and Philosopher of Motordom.

From Charles E. Duryea, Michigan.—Your little article on air-cooled motors, page 68, May issue, is quite correct with the exception of the last paragraph which, although also correct, needs a little explanation. The water-cooled advocates may claim less fuel, but they are unable to show it for the reasons mentioned in the first part of the article, viz., that the air-cooler working at a higher temperature is more economical. It should be quite clear to anyone that if the walls of the engine could be as hot as the working charge, as in a steam engine, they would not take energy from the charge, and this would give the highest economy.

A water-cooled engine with its low temperature walls is wasting fuel for the purpose of boiling the water instead of propelling the vehicle, and therefore, cannot be so economical as the air-cooled. Since it carries away the heat rapidly in an attempt to keep the walls cooled to a very low degree, the water-cooler requires much more radiating surface, as shown by the large complicated radiators carried, whereas the air-cooler running with hotter walls does not need to get rid of so much heat and is always built with much smaller cooling surfaces. These facts clearly disprove any claim that the water-cooler is able to use less fuel.

As gasoline goes higher in price this matter of fuel economy becomes more important, and as the automobile gets down within reach of the purchasing power of the masses, the air-cooler must be recognized more fully than at present.

With respect to oil a slightly different argument applies. There is no more surface to lubricate and no more speed to the air-cooled piston than to the water-cooled, but working at a higher temperature a different oil is required. Some people attempt to meet the high temperature by increasing the quantity, but this is not the proper procedure and this wasteful method of oiling has given rise to the term "oil-cooled." The simple requirement is that oil be used which can meet the needs of the higher heat to which it is exposed. In your article you expressed the opinion that whereas the wall temperature of the water-cooler was probably 212 degrees, the temperature of the air-cooler was probably 350 degrees. I think the differences are even greater than this but instead of oils with a fire test, of 400 to 500, as is commonly used, or possibly up to 600 degrees as sometimes is found, we can employ oils with fire tests as high as

750 or 800 degrees and thus perfectly lubricate the walls of the hot engine.

I have gone into this matter quite fully during the past dozen or fifteen years and have always used engines with very slight cooling. We are at present practice, feeding one pint of oil with each five gallons of fuel, and getting perfect lubrication therefrom. We expect to slightly better this in the near future and have already in experimental tests secured satisfactory lubrication from a pint of oil to each seven gallons of fuel. In our 2-cycle engines, air-cooled, we lubricate by mixing this oil with the fuel so that there is no attention whatever required and no adjustments of the oil devices to make. Greater convenience than this cannot be found. These engines have but two cylinders, $3\frac{3}{4}$ bore and stroke, yet they propel our vehicles weighing 800 to 1100 pounds with two or four, and sometimes five passengers, much better than 20 miles per gallon, over average roads. From this it will be seen that a gallon of lubricating oil will serve for 800 miles up to twice or three times that distance. Few water-cooled engines can show such results.

Note by the Editor—It is always a pleasure to listen when Mr. Duryea speaks, for "Where McGregor sits, there is the head of the table." In this instance he inadvertently puts in a good word for his own car, but why shouldn't he, since he invariably gives more than he takes? The entire world is full of "give and take" and blessed is he who gives more than he takes. Just one point and one only in relation to Mr. Duryea's interesting statement. He says that the air-cooled engines run with hotter walls. This is of course true. But some water-cooled adherents might argue that there is nothing gained by having the walls hotter than 212 degrees, even though the oil does not fire at such a heat.

DRIVING THE CAR.

An Art Requiring Study, Practice and in Some Cases Close Application.

From J. N. Bagley, Nebraska.—The first thing to consider in motor car driving is to know how to start and stop. This, however, may seem to the beginner rather absurd, but nevertheless it is the prime essential to good driving. Many drivers of considerable experience neglect proper practice along these lines. In starting, a common fault is to allow the clutch to engage too quickly, instead of gradually as it should. The writer has seen drivers who seem to think that it impresses the onlookers to see a groove cut in the road or street by the rear driving wheels being slid along with the brakes. A driver of good judgment knows when the power is applied too great. The treads will either be worn away or the fabric loosened by the heat that is generated by the friction.

In the case of an engine, with high power especially, the throttle should be used in starting the car so as to diminish the force, while, in the smaller power engines, especially if the fly wheel is light, it may, on the contrary, be necessary to speed the motor slightly by opening the throttle to prevent "killing" the motor, then shifting from low to high speed. In either case it will be well to keep the spark lever a trifle retarded until the car is well under headway, or until the car moves smooth in the highest speed. At this time the spark should be advanced to the regular running position. The writer has watched very closely, both amateurs and professionals, and many of them start the cars with a jerk. In case the clutch

"grabs" and starts the car abruptly, the strain on the working parts is such that many times it results in a breakdown, or leads up to one. For example, a cord tied to a brick-bat will move it along nicely if started gradually, but on the other hand if a quick jerk is given the string will break without moving the brick.

Of course, a rough clutch is at times at fault as well as the driver, but a clutch that is difficult to handle should be repaired, or replaced. In case the clutch leather gets dry and hard it should be oiled from time to time with castor oil, or if castor oil cannot be had linseed oil will answer well. A wise motorist will take particular pains that the clutch leather does not get into a condition that it will jerk and be hard to manipulate. A clutch working well will have a feeling resembling a cushion pumped with air, and will gradually take hold, moving the car but an inch at a time if necessary. Any of us can recall instances where a driver has let the clutch engage so suddenly that the wheels would make two or three revolutions before the car moved, throwing cobble stones and dirt twenty or thirty feet from the car. This puts an unnecessary strain on the working parts of the car and shortens its life wonderfully. The more gradually the car is started the better it is for the life of the car and tires.

In stopping, the same principles hold good as those applicable in starting the car. It has been universally agreed that it is both bad form and bad mechanics to stop suddenly, unless something unexpected demands it. For instance, to drive up to the curb and not apply the brakes until within a few feet of the place to stop is a common fault. In this case the tires are damaged by skidding over the road or street. In case of soft gravel, a deep rut is often cut in the road. The writer knows of an instance where a driver to "show off" came tearing up to a building (facing it) and when within a few feet applied, or rather tried to apply the brakes. It chanced that the cotter had some time worked out of the eye bolt and allowed the brake to become disconnected from the foot pedal. The result was the car crashed into the brick building, rendering the driver unconscious and breaking one of the passenger's arms, besides damaging the car to the amount of \$150. "The school of experience is many times a dear one, but fools will have no other." The proper way is to take care that the speed of the car is gradually reduced. The brake ought to be applied fairly hard, while the car is running at a comparatively high speed, but when the pace lessens, the brake pressure should be lightened and the car brought to a standstill gradually. Drivers should abandon the useless, dangerous and expensive practice of jamming on the brakes hard at the last few feet before stopping. When this sort of stopping is made a practice, sooner or later the brakes will fail to work. One should always keep some brake-power in hand.

As nearly every car differs as to the amount of power required on the clutch-pedal, the time and distance of its use, and when to disengage it before a change of gear is made, in every instance it is a good rule to remember, when changing from a lower to a higher gear, that the clutch requires to be disengaged to a fuller degree than when changing the speed from a higher to a lower gear. The reason for this is because the engine shaft must be allowed to revolve less quickly before the higher gear—meaning in this instance slower revolutions—can be properly engaged. In the case of changing from high speed to a lower

one, the clutch should not be taken out completely, as the engine will run faster on a slow speed than it will on a higher speed for at least a few yards before the speed could be reduced. The method for changing gears will vary with every make of car, consequently it would be impossible to attempt to deal with each separately in this article. One point will apply to all. The changing of gears on all makes should be done with ease, and in no instance should force be exercised. If the gear will not go in comparatively easy and without undue strain, slow the engine down still further, and have another try, but on no account should force be used. The grating and rubbing of two sets of gears, should be as unwelcome to the ears of a mechanically minded driver as discords to the trained ear of the musician.

Let us now go out onto the road, and consider a few points. On a down grade it is advisable, when possible, to give the gear a rest, so as to allow a relaxation of the strain on the various bearings. Therefore it is by no means a poor plan to throw the gear out entirely on such occasions, by releasing the clutch or placing the speed gear lever in a neutral position. This gives the bearings a chance to take oil or to cool and gather a new film of lubrication.

A fault that most new beginners have in shifting gears on the hill is not making the change until the speed of the car is too low, and by the time the shift can be made the car has stalled. Unless the driver is very careful the motor will be killed. To make a change of gears on a hill requires experience and judgment, and no exact rule can be laid down. One should not change gears oftener than is necessary. With the present day motor car it is possible to run, on good roads, nearly all day without making a change of gears on a hill unless it is unusually rough or steep. The speed may be varied to a large extent with the use of the throttle. The back gear should never be put in until the car has been brought to a dead stop, and the forward gear should never be put in until the car has ceased to run astern. Over rough hilly roads the brakes should be tried from time to time to ascertain if they are in perfect working condition. A time may perhaps arrive when the brake will not be sufficiently powerful for the required purpose, and consequently an accident ensues. There is no justice whatever in laying the blame on the maker. When descending long steep hills it is advisable to use the hand brake, for the foot brake, operating as it does, through the countershaft, is apt to cause undue heating of the bearings of the counter shaft. Aside from this a great strain is thrown on the differential in turning corners with the brake applied to the countershaft. In driving in traffic, of course, the foot brake will have to be used in preference to the hand brake.

Position to Sit When Driving.

Many people do not study the correct position to sit when driving, but by giving the matter a moment's thought one can readily see there is much to the position behind the wheel. If the driver bends too much forward, not only are the eyes in the wrong position for seeing well ahead on the road, but the idea of straining for excessive speed is given. So much is this the case, where a very forward position is practiced, that policemen invariably add on a few more miles an hour in case of prosecution feeling no doubt sure that such an attitude is only compatible with the speed maniac. The extreme backward position is equally wrong, as there is then a loss of power over

the pedals and a greater strain on the arms in steering, especially if the roads are rough and hilly. The correct position, is between the two. The driver in this position has full and easy control of the pedals and steering the car over rough hilly roads does not become tiresome. On the modern car the "push" pedals are rapidly coming into use, therefore the driver's seat should be more upright than other seats in the car. The steering wheel should not be gripped too tight, but firmly. There are three ways of holding the steering wheel, of which two are very good, and one of them is used as a change of position to rest from the other. The best method is to hold the wheel with the palm of the hand upward, it is also quite safe to hold the wheel with the knuckles upward. One should not grip the wheel by one of the spokes, as it is impossible to have control of the wheel if held in this manner. Of course, on long journeys it is necessary to change positions to rest the hands and arms, and by turning the hands over on the rim of the wheel will answer the purpose well. I have seen drivers, roll a cigarette while running along the country road, thus endangering the life of themselves and all present. On one occasion I knew of a young man who boasted he could run for a mile down the road without touching the steering wheel, and went so far as to influence his boy friends to take a ride with him and he would show them. They were running about thirty miles an hour when some little thing in the road caused the car to dart to one side so quickly that it was impossible to stop it. The car was overturned and badly smashed. None of the party was killed, but one was crippled for life.

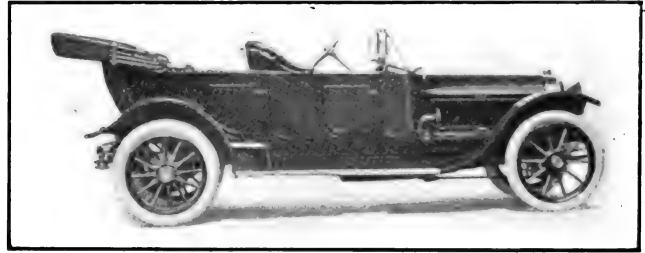
A Hint Regarding the Gasoline Pipe.

A mechanic was one day in charge of a motor car, driving it on a running test, when he had a very singular experience. When coming down an incline the car suddenly stopped. As this was an unusual circumstance he was at a loss to understand it, but ultimately decided that it was due to a shortage of gasoline. He got out and flooded the carburetor, and found that this took some time to accomplish, but when it was done the engine started quite easily with the first pull up of the crank and the incident did not happen again for several days. In the meantime the carburetor had been thoroughly cleaned out and examined, but nevertheless the engine stopped again in just the same way as before and again the indications were those of shortness of gasoline. This was a puzzling case until it was noticed that the gasoline pipe had been fitted up on the car with a considerable number of turns and twists in it and it was thought that possibly this might have something to do with the matter. Accordingly the pipe was taken off and a new one fitted, with as few bends in it as ever possible, and it was found that this alteration answered the purpose absolutely satisfactorily. As a matter of fact, what did actually occur was that there was an air lock in the gasoline pipe and only under high pressure could this air lock be removed. The fitting of a new pipe which was nearly straight cured the cause of this trouble. The incident, however, is worth noting, inasmuch as the examination of the pipe-work systems on board many motor cars will reveal the fact that not quite enough trouble has been taken to secure simple and easy run for the pipes. Apparently the designer carefully arranges all his main portions of gear and leaves Tom, Dick, and Harry to settle between themselves how the connec-

tions are going to be made. The result is that in many cases the work is turned out as regards the pipe fittings in a way that would make the average plumber ashamed of himself, and possibly a good many of the failures that are put down as mysterious might be traceable to simple causes such as this.

The \$5,000 Peerless.

Color—Optional.
Seating Capacity—Five persons.
Clutch—Expanding.
Wheel Base—137 inches.
Gauge—56 inches.
Tire Dimensions—Front, 36x4½ inches; rear, 37x5 inches.

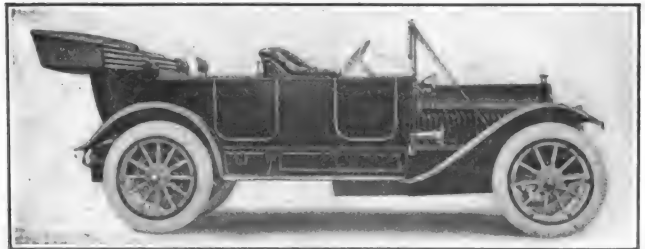


Peerless "48-Six" Phaeton.

Brake Systems—Contracting and expanding on both rear wheels.
Horsepower—(A. L. A. M. rating) 48.6.
Cylinders—Six.
Arranged—Vertically, under hood.
Cast—In pairs.
Bore—4½ inches.
Stroke—6 inches.
Cooling—Water.
Radiator—Tubular.
Ignition—Jump spark.
Electric Source—High tension magneto and storage battery.
Drive—Shaft.
Transmission—Selective sliding gear.
Gear Changes—Four forward, one reverse.

The \$5,000 White.

Color—Optional.
Seating Capacity—Seven persons.
Clutch—Cone.
Wheel Base—132 inches.
Gauge—56 inches.
Tire Dimensions—Front, 37x5 inches; rear, 37x5 inches.



White "60" Touring.

Brake Systems—Contracting and expanding on both rear wheels.
Horsepower—60.
Cylinders—Six.
Arranged—Vertically, under hood.
Cast—In block.

Bore— $4\frac{1}{4}$ inches.
 Stroke— $5\frac{1}{4}$ inches.
 Cooling—Water.
 Radiator—Honeycomb.
 Ignition—Jump spark.
 Electric Source—High tension magneto.
 Drive—Shaft.
 Transmission—Selective sliding gear.
 Gear Changes—Four forward, one reverse.

ELECTRIC SELF-STARTERS.

The New Vibrating Switch Outfit Used by the Remy Electric Company.

H. G. Deupree of Remy Electric Co., before the Indiana Section of the Society of Automobile Engineers.—There are two general methods by which self-starting of engines is accomplished:

One consists in merely substituting another source of energy for the muscular efforts of the chauffeur. This may be compressed air, electricity or special mechanical device. In the former case the air may be introduced into the cylinders through suitable valves, causing the pistons to move by its pressure on them. The electrical and mechanical devices apply the power to the crankshaft of the engine.

The second general method consists in producing an explosion in the cylinder of the motor when the motor is at rest, and by this means starting the engine. It is the problem of the acetylene gas systems to get the gas into the cylinders. It is the problem of the ignition makers to explode this gas by means of an electric spark. While these problems are distinctly different, yet they are so closely allied in actual operation that the maker of the starter and the maker of the ignition apparatus can assist each other and the entire industry to a large extent if each will work out his proposition, keeping the object of the other in mind and co-operating for the best ultimate results.

The operator of a car finds that the fuel mixture may have been left in the cylinder since the last run, or it may be introduced there just previous to starting. In the latter case, instead of the gasoline mixture, some other substance, giving better starting conditions, such as acetylene, may be employed.

The charge which is exploded to start the engine, and also the next few charges, are frequently of inferior quality and do not readily ignite.

In other words, the conditions for starting may not be favorable, and the entire result may depend upon most perfect ignition. It is the object of the ignition designer and maker, therefore, to produce an ignition system that will overcome, as far as possible, all adverse conditions.

A regular dual ignition device, incorporating a battery wired through the same coil as the magneto, offers a generally satisfactory means of starting without cranking. This system is equipped with a push-button which acts on the battery current in a manner exactly analogous to the action of the magneto timer or contact-breaker. The push operation is equivalent to making the circuit, and the release is equivalent to breaking the circuit. The operator, by holding down the button, may release it gradually, making the break a slow one, and therefore not as effective as a snap.

The spark is produced in the cylinder containing the fuel charge or upon the working stroke. The connections of this push arrangement are necessarily

in parallel with the magneto timer or contact-breaker. The spark will not occur when the magneto contact-points are closed.

It is possible for the motor to stop occasionally in such a position that the contact-points will be closed. This happens very infrequently. In fact, our experiments show that it stops in this condition only about once in fifty times.

It is impossible to eliminate this occasional failure altogether because a cam that would take care of this feature every time would not be entirely satisfactory for its chief work while the car is running.

Then, again, it is possible for the motor to stop in such a position that a spark occurring even with the magneto timer contacts closed, would not furnish the desired results; for example, if the motor stops so the exhaust valve is beginning to open, or about 45 degrees before bottom dead center, or on top dead center. Theoretically, motors do not stop on dead center, but they do in actual practice, especially when new.

Of course, the single spark system is not as positive for igniting as a shower of sparks, where a bad mixture must be fired. This bad mixture, of course, may be the result of bad gasoline carburetion or a faulty mixture of acetylene and air.

This, together with the fact that a vibrated spark may be produced to operate regardless of the position of the magneto timer contact, and also because the operator cannot interfere with the quick breaking of the circuit, has resulted in the demand for what we style a vibrator switch outfit.

In the new Remy vibrator outfit the coil is contained in a tube, on one end of which are the vibrator and the binding posts for connection to the battery. The other end contains the binding posts to be connected to the magneto cable. The vibrator is enclosed.

The cylindrical switch casing is securely fastened to the middle of the tube. This casing projects through the dash. Surrounding the projecting switch casing is a finishing ring. This ring and the switch are the only parts of this system which are on the driver's side of the dash. The complete unit is secured to the dash by three screws, passing through the finishing ring and the dash to tapped holes in the base of the switch.

The switch lever is permanently attached to a spindle projecting from the switch casing, and is adapted to either hand or foot operation. It may be locked in the off position by removing a key, which fits a keyhole located above the switch lever.

The switch lever has three positions, an off position, a magneto position and a battery position, being the middle, right and left positions, respectively, besides the hereinafter described starting position. When the switch is in the battery position the vibrator is in operation, under the control of the timer. In moving the switch lever from the off to the battery position, the starting position is passed through, and the vibrator is caused to operate and produce a shower of sparks regardless of the timer.

When the switch passes over this starting position, however, sparks are supplied with certainty, and by the further movement of the switch the sparking is put under the control of the timer. It is not necessary to stop on this intermediate position, but merely to turn the switch from the off to the battery position with a continuous motion, and then, due to the use of the vibrator, a shower of sparks is obtained after the engine has commenced running, which is of

great value, because the first few charges to be exploded when starting may consist of bad mixtures, which require several sparks to ignite them.

By passing through the intermediate vibrator position the series of sparks occurs only in the cylinder ready to fire. By the time the next cylinder in order is ready to fire the vibrator spark is under control of the position timer of the magneto it might continue to spark in the wrong cylinder, causing a backfire or failure to ignite the next cylinder.

When the switch is in the magneto position, the vibrator is out of action, single sparks being obtained.

This vibrator switch ignition outfit is designed to operate with either two, four or six-cylinder motors and with single or double set of plugs.

Type vs. vibrator coil is of the transformer or umbrella type. The core is composed of a number of laminations of annealed alloy steel, cut, not stamped, and about one-fiftieth of an inch thick. The composition of the steel is such as to entail a minimum of magnetic lag in the core.

The umbrella type of coil has been selected for this vibrator in order to make possible the production of an intense spark. The makers of this coil are of the opinion that, with a steady deteriorating degree of gasoline, the spark gaps will be widened in the future, and that the problem facing the ignition device manufacturer is to construct apparatus capable of producing a spark of very high tension. The transformer type of coil has the advantage of permitting a relatively great amount of winding to be used. There is enough room on the VS coil for a secondary winding, producing a spark tension three to four times that required nowadays, and sufficient to jump a relatively wide spark gap. The object of the Remy Company, in designing a coil of these characteristics, is to construct a product adaptable to a motor using gasoline of low thermal value, which must be ignited by means of a highly intensive spark.

In the type VS coil the condenser is contained in the coil casing, but where length of coil is an item, the type RL coil which is somewhat shorter than the VS design, may be used. In this construction the condenser is contained in the arch of the magneto, which is called Model RL.

The method of installing the vibrator coil and of connecting it to the magneto is most simple. One end of the casing has three terminal screws, marked red, green and yellow, which are connected to the terminals so marked on the magneto. The other end of the casing carries two terminal screws, which are connected to the battery poles. A button on the vibrator is connected to the center of the distributor on the magneto.

Wire and Wood Wheels.

It was definitely shown by a test of fifty wire wheels against fifty wood wheels that a saving of 33 per cent. in the wear on pneumatic tires really was effected by the use of wire wheels. In a recent article a French writer finds this due to the smaller weight of the wire wheel. Assuming that a wire wheel, because it will support a much greater load in its own plane than the wood wheel of equal weight, is also stronger against all other stresses to which a wheel may be subjected, although its resistance to buckling under a lateral strain must depend almost wholly upon the strength and rigidity of the metal rim, which should therefore by all means be made very stiff, he finds that this lightness of the wire wheel must be the all-important property with regard to tire wear.

Speaking of other advantages of the metal wheel, the author says: "The metallic wheel raises less dust than the wood wheel. This is an experimentally ascertained fact which may be explained. The thick wooden spokes produce a considerable air resistance as well as fan action, and the dust is drawn into the vortex of air so created.

Charging Electrics.

In some cases where complaints have been made by garage owners that their charging costs for electric cars were running unduly heavy, battery experts have been despatched to the spot, only to find that in the effort to bring a given battery up to its prescribed end-of-charge voltage, the attendant was putting about twice as many kw. hours into the cells as they properly needed—not only wasting energy and casting unfair reflections on the cost of running the car, but also working damage to the plates.

The real index to the condition of charge in a battery, is, of course, the specific gravity of the sulphuric-acid electrolyte. As the cell is discharged, the specific gravity falls, ranging from 1,280 in a fully charged condition down to 1,160 when the cells are about exhausted. The proper time for starting and stopping the charge is fixed by the reading of the hydrometer, and to show the simplicity and convenience of using this instrument in electrolyte drawn from one of the cells by means of a syringe, full size illustrations are being got out by the company making the test.

For any given car a definite relation can thus be worked out for the number of amp-hours or mile-travel in a battery in terms of its specific gravity of electrolyte. For example, a certain pleasure car which will run 72 miles on good streets when charged to a density of 1,280 can positively be relied upon to go 60 miles when the gravity has fallen to 1,260, 41 miles at 1,240, 36 miles at 1,220, 24 miles at 1,200 and 12 miles at 1,180, becoming fully exhausted at 1,160."

Farmers Take Time to Think It Over.

As Western farmers have been too busy plowing to talk cars, the salesmen of the United States Motor Company are traveling with extra farm hands who do the plowing and other work while the farmers listen to the salesmen or take demonstrations. For the past two years the motor car has been giving proof of its worth to the agriculturists and those who were slow to take up with the power-driven vehicles are now buying them with enthusiasm.

Not alone the small cars, but cars selling as high as \$2500 are being bought in quantities. The Maxwell continues to show substantial increase in the farming districts where reliability and long life are demanded.

Platinum More Valuable.

There is a steady demand for metals that are not only good conductors of the electric current, but which will stand a high degree of heat without fusing or melting. Silver has the lowest melting point, succumbing to 1,850 degrees Fahrenheit, while gold comes next at 1,983, with that well-known alloy, brass, at 1,900, while copper yields at 2,160. For this reason platinum, which does not melt until exposed to 3,227 degrees, has become the most universally used metal for automobile ignition purposes, and the great demand for the metal has caused it to rise to a price of two and a third greater than that of gold.

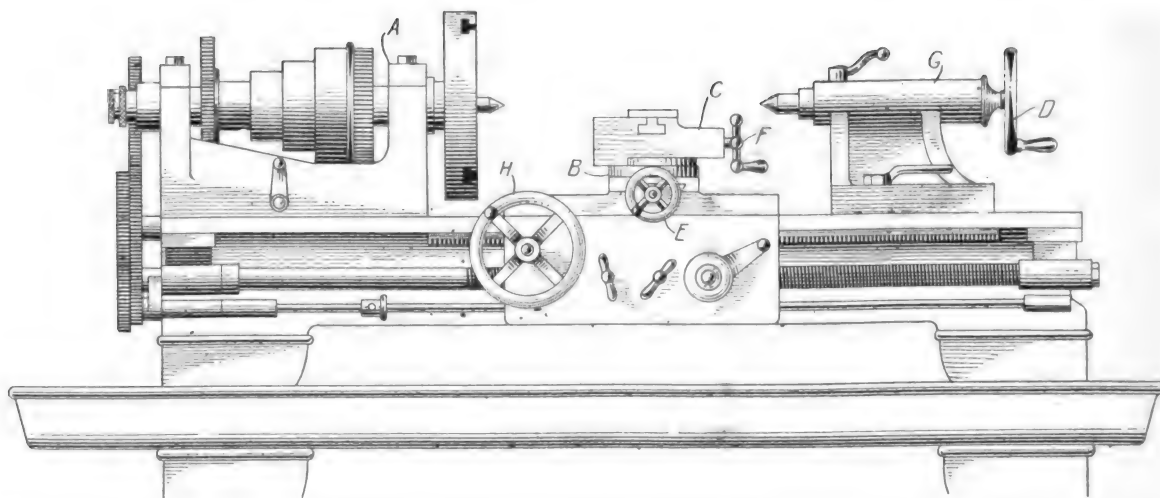
Keep the wiring in good order. There is more trouble from defective wiring than all other causes combined.

LATHE WORK.

Varied Uses of a Modern Machine and How It Is Indispensable for Automobile Work.

Although it is true that the modern car is remarkably well designed and therefore reliable, and although it is equally true that the materials employed in its production and the manner of their application are such that wear and tear are reduced to a minimum, nevertheless friction is indissolubly associated with every form of motion, and use must therefore result in parts, how-

ever better results, but a decided saving in cost of upkeep. Another point that contributes to this latter item is this, that, provided one has a reasonable equipment of tools, one can carry out small repairs at home more quickly and cheaply than if the job were handed to a firm of repairers. Garages and repair shops are in some cases still a long way from perfection, and many owners, quite rightly, entrust their cars to them with some trepidation. Carried out by themselves, repairs can be effected with this security at least, that paintwork and cushions will not be mishandled, that the body will not



View of an up-to-date Lathe. A, headstock; B, saddle; C, slide rest; D, hand-wheel operating saddle; E and F, hand-wheels of slide rest; G, tail stock; H, lever operating clutch of leading screw.

ever perfectly they are made, wearing out and requiring renewal. The car of today is not a frequent visitor to the repair shop except in case of accident, but the time must and does come when, if it is to run satisfactorily, it must be overhauled and fitted with new parts.

It is to be regretted that one result of progress towards perfection has led a large proportion of motorists to think that it is better that things should be done for them rather than by themselves. In days past, when to meet a motor on the road was something almost worth writing to the papers about, the automobile owner was almost sure to be either a professional or an amateur mechanic.

Today things have changed considerably, and whether the owner occupy the back seat or sit behind the steering wheel, he is probably in the aggregate less of a

mechanic than ever he was. While many such owners are best advised to continue in their present course of sending the car back to the works or to an adequate garage when the smallest adjustment or repair has to be made, nevertheless there are a great number whose minds are sufficiently logical and whose hands are sufficiently practical to save them this trouble, did they realize that in a great many cases they could do their own running repairs, and indeed there are a great many reasons why they should do so.

To this class of man, provided he has a certain amount of mechanical knowledge and a reasonable allowance of common sense, nothing could be better recommended than the execution of his own car repairs when they come within the capacity of a reasonable tool equipment. Such work provides an almost ideal form of hobby. It is interesting, educative, useful, and best of all, it pays for itself. It is true that wonders in the way of repairs, can be performed simply with a three-cornered file and a cold chisel. The average tool equipment supplied with a new car is adaptable to a great many purposes, but these, after all, are decidedly limited in number. Add to them a lathe of even the simplest construction and the number of their uses is multiplied almost infinitely.

Twenty-five years ago a lathe would have cost so

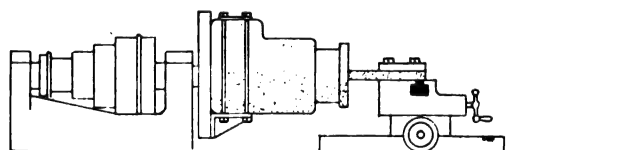


Fig. 2.—Reboring a cylinder attached to a face plate on the headstock mandrel.

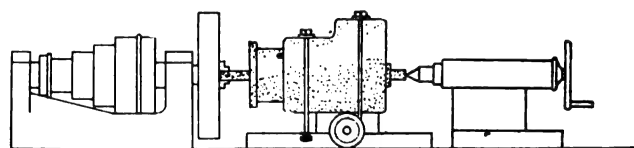


Fig. 3.—Reboring a cylinder attached to the saddle.

In the first place, to improve one's knowledge of a car is bound to result in a more sympathetic and a more efficient use of the mechanism generally; thus to a certain extent, to do one's own repairs is to render their necessity less frequent. This in itself means in time not

only better results, but a decided saving in cost of upkeep. Another point that contributes to this latter item is this, that, provided one has a reasonable equipment of tools, one can carry out small repairs at home more quickly and cheaply than if the job were handed to a firm of repairers. Garages and repair shops are in some cases still a long way from perfection, and many owners, quite rightly, entrust their cars to them with some trepidation. Carried out by themselves, repairs can be effected with this security at least, that paintwork and cushions will not be mishandled, that the body will not

large a sum that the hope could hardly be held out that it would never pay for itself, apart from the pleasure it would be capable of giving. Today one can buy a lathe of almost innumerable possibilities for a sum that only the most modern methods of manufacture and the cleverest design have rendered possible. A good lathe is a workshop in itself, a fact which is rather masked by an age of specialization.

Common sense and a lathe can do almost anything on a small scale. The result is that at almost every

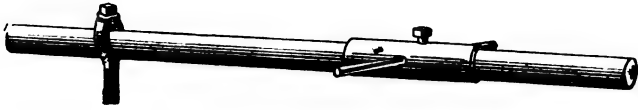


Fig. 4.—The type of boring tool used in Fig. 3.

point time and labor are saved, as well as the fact that the handling of jobs of all kinds can be carried out with great facility.

The sketch Fig. 1 shows the general arrangement of the business part of the lathe, the body of which is supported on trestles.

The headstock, seen at A, contains a hollow steel mandrel or spindle running in adjustable bearings. The mandrel is furnished with a three-speed belt cone and also a back gear which works exactly like an ordinary change speed gear box except that it is not thrown into operation while the machine is running. When it is in use the belt cone runs loose upon the mandrel and drives the latter through a double-reduction spur gearing, giving a very low mandrel speed. By this means heavy cuts can be taken in work of large diameter.

The saddle B carries the slide rest C. Longitudinal movement of the saddle is effected by the hand wheel D and transverse or cross movement by the hand wheel E, both hand wheels operating screw shafts. The slide rest C, which supports the lathe tool in a special holder, can be easily detached from the saddle, and is swivelable

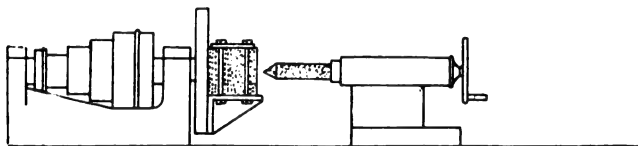


Fig. 5.—Drilling a piece of work attached to a face plate on the headstock mandrel.

in a horizontal plane upon it. Operation of the hand wheels E and F therefore brings it into any desired position relative to the work in the lathe, while the hand wheel D will move the saddle as a whole in either direction in a horizontal plane. G is the poppet head or tail stock which can be slid along the body and clamped in any position, from which fine adjustments can be made by means of a hand wheel operating a square thread screw. On the left hand side of the head stock is a train of spur pinions, the purpose of which is to provide an automatic longitudinal movement of the saddle B for the purpose of screw cutting or rendering unnecessary the use of a hand feed when work is being done in which there is some little length of constant diameter.

The screw shaft which accomplishes this longitudinal motion of the saddle can be hand operated by the wheel D. It is, however, connected by a spur gear to a horizontal shaft immediately underneath it, which can be driven from the headstock through the train of pinions before mentioned. This lower shaft is furnished with a clutch operated by a small horizontal lever H, so that it can be engaged or disengaged at will.

Supplied with the lathe are a number of spur pinions

of different diameters, by the use of which practically any ratio of movement of the lead screw relative to the mandrel can be obtained, and by this means screws, both right and left-handed, of any desired pitch can be cut with perfect accuracy. The lathe is supplied with pinions suitable for cutting threads.

One of the points of the lathe shown is that it is essentially a horizontal boring machine. To the unmechanical this bald statement does not convey very much, and it will therefore be explained. Primarily the difference between a lathe and a boring machine is this, that in the former the work revolves and the tool remains still, while in the latter it is the tool that revolves and the work that remains stationary. Supposing, for the sake of example, it were desired to bore out the cylinder of a small engine. In the ordinary course of events—that is to say, with the ordinary type of lathe—the work would be clamped by an angle plate to the face plate of the mandrel while the tool would be carried in the slide rest, as shown in the diagram Fig. 2. It is clear from this that to bore quite a small cylinder would require a lathe of great strength and rigidity, owing to the great overhang of the work beyond the headstock bearings, to say nothing of the fact that the weight of the casting would

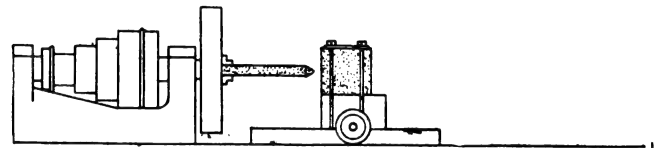


Fig. 6.—Drilling work attached to the saddle,

in itself be detrimental to the headstock bearings, and in revolving would be required to be balanced, if it were not to shake the whole machine about very seriously. If the work be arranged in this manner the boring of a cylinder of 3in. bore would require the use of at least a 12in. lathe, weighing, perhaps, a ton and costing a considerable sum of money.

Yet this job is, by reason of its clever design, quite within the capacity of the lathe shown, which in this case is used as a boring machine and arranged as shown diagrammatically in Fig. 3. The slide rest is removed from the saddle, and the cylinder to be bored is put in its place. For this purpose the saddle is T slotted, so that work of almost any shape and form can be secured upon it (provided it comes within the capacity of the lathe). A boring bar is then held either in a self-centring chuck or between the lathe centres (where it is revolved by means of the usual carrier and face plate), while the cylinder on the saddle is fed either by hand or auto-

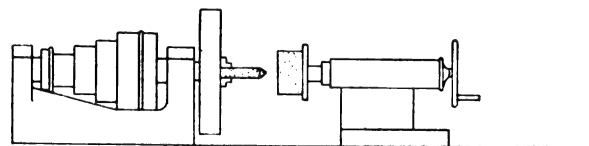


Fig. 7. Drilling work backed by the tailstock.

matically up to the revolving tool, whose plane of rotation, of course, remains stationary.

The boring bar, which is shown partially in Fig. 3, is more clearly portrayed in Fig. 4. It consists of a stout steel rod. Drilled through it is a transverse horizontal hole, through which passes a small boring tool and which is held in position by a cotter or a set screw, the latter form being shown in the sketch. The tool can, of course, cut to various diameters by sliding it in or out of its hole.

Just as this lathe is a boring machine, so likewise it is a horizontal drilling machine, and, in fact, allows of three

different ways in which this operation can be carried out. First of all the job can be arranged as indicated in Fig. 5—that is to say, the work attached to the face plate and the drill carried in a chuck supported by the poppet head, its feed being accomplished through the hand wheel on the latter. Secondly (Fig. 6), the drill can be carried in a chuck on the headstock mandrel while the work is clamped to the saddle. In this case the work can be moved longitudinally and transversely by means of hand wheels, while for altering its height packing pieces are introduced. The third way (Fig. 7) consists in mounting

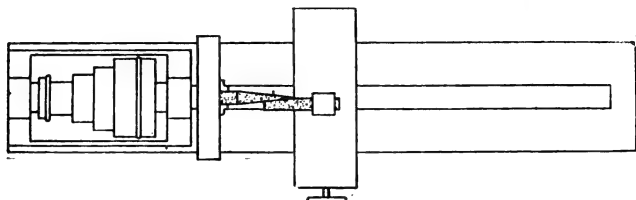


Fig. 8.—Taper turning effected by swivelling the headstock.

the drill, as in the last case, in a chuck on the mandrel and supporting the work on a small plate which fits into the hollow spindle of the poppet head.

In the first case, it will be seen that the work moves while the drill remains stationary, while in the two latter cases the reverse happens. The first method is suitable for light pieces, especially those which can be held in the headstock chuck without the use of a face or angle plate. The second method is suitable for heavier jobs which are of inconvenient shape and weight, and have to be held very rigidly, while the third is especially convenient for light work, which can be held on the back plate by hand, as, for instance, in drilling strip or plate, in which case, of course, a wooden body is introduced between the work and the back plate to avoid damage to the latter when the drill runs through.

Another point of this lathe is that it is perfectly adaptable for taper turning. When this type of work is small

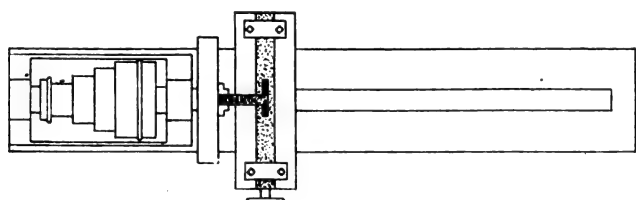


Fig. 9.—Milling a key-way.

(such as, for instance, in making taper plugs for taps, or small reamers), the headstock can be set over so that it is no longer in line with the longitudinal movement of the saddle and slide rest (Fig. 8). For this purpose it is movable and fitted with a graduated scale so that it can instantly be reset to turn parallel. Taper turning can also be accomplished by adjusting the direction of movement of the slide rest, the swivel joint between which and the saddle is also graduated. For long taper work the tail stock or poppet head can be set over in a similar manner to the headstock. In each case the degree of taper can be adjusted with great accuracy.

The capacity of the tool to serve as a lathe, a boring machine, and a drilling machine, has already been mentioned. Fig. 9 shows diagrammatically the milling of a slot or keyway in a shaft. For this purpose the work is clamped to the saddle while the milling cutter is carried on a bar and held between centres, or else in the headstock chuck. The transverse position of the cut is regulated by the lead screw, the feed by the hand wheel upon the saddle, and the depth of cut by packing pieces under the work. Slots

can, of course, in like manner be cut in various kinds of work with perfect ease and accuracy.

For face milling the cutter is carried in a chuck on the headstock mandrel, whilst the depth of surfacing and the feed are regulated by the lead screw and the saddle hand wheels. The work is then arranged as indicated in Fig. 10. Planing of quite large and perhaps irregular surfaces is carried out in a somewhat similar manner to the last case except that, instead of a milling cutter, a single point tool is used, the work being as before carried on the saddle (Fig. 11). The tool for this purpose is bent in the shape of an L and clamped to the face plate, and is revolved against the work which is fed up to it as previously described. The cut which the tool makes is not a straight one, but is the arc of a circle of constant diameter. This, of course, does not in the least affect the accuracy of the work. By using a low mandrel speed as, for instance, with the back gear in, quite heavy planing cuts in cast iron can be taken. Here again, the special utility of the lathe is demonstrated, as the weight of the work does not cause any overhang or stress on the headstock bearings, as it would do if the tool were held stationary and the work attached to the face of the plate.

However, besides making things, the lathe is capable

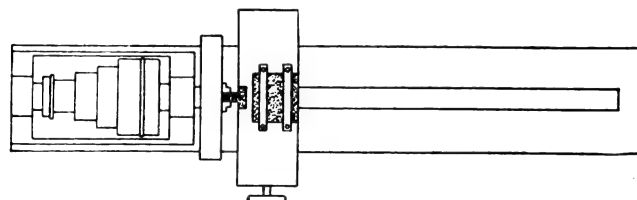


Fig. 10.—Face milling with a cutter carried in a chuck.

of performing an endless variety of odd jobs and performing them in the most desirable manner. For instance, it is desired, we will suppose, to reduce the thickness of a bolt head to get it the more readily into a certain position. The job can be done with a file, it is true, but it can be done in a quarter of the time and with much greater accuracy and perfect finish on the lathe.

Spare valves are not infrequently sent out a little longer than the original ones to allow for possible wear on the cams and tappets. In this case it is easy to file a small amount off the foot, but this method can never result in perfect squareness. The job can, however, be done in the lathe either in the chuck or between centres with perfect accuracy.

All sorts of nuts and bolts can be made with the utmost precision. Frequently to be able to do this sort of work,

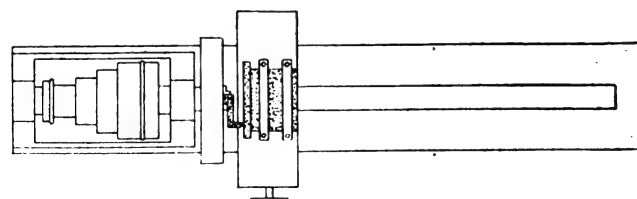


Fig. 11.—Face planing with a single point tool.

means the saving of a day or two when perhaps only a single bolt is required.

Bushes, both solid and split can be bored and turned. The former type are best machined in the chuck, but the split type, especially if of fairly large size, can be bored in a manner similar to that described above for a cylinder.

Keyways which have become distorted or loosened by wear can be milled out and new keys fitted. Leaky taps can be cured by having new plugs. This lathe will turn

out piston rings to $7\frac{1}{2}$ inches in diameter, while it will complete machine a piston of $4\frac{1}{2}$ inches diameter. Carburetor jets of any size that the experimenter may fancy can be speedily manufactured. In fact, the uses to which a lathe can be put are too numerous to mention.

By its aid useful tools can be turned out at a very low cost, as, for instance, valve seat truers, and not only tools but fittings such as extra air inlet valves and all manner of really experimental devices which give scope to the inventive genius of the amateur mechanic. In many such cases lack of success is more than anything due to ill construction. A good lathe prevents this.

Price Cutting and Price Fixing.

From Reader, New York.—It goes without saying that the public is interested in purchasing goods at fair prices and at a fair margin of profit, but it is far more vitally concerned in getting just what the purchaser pays for; in buying goods that are good for something rather than goods that are good for nothing; in getting honest weight, or honest construction and honest material.

In the matter of price there is and can be no deception; if it be more than one can afford, or more than he thinks the article, machine or tool is worth, he may refuse to purchase it, and such refusals in the aggregate should and will so curtail sales, that prices will soon be reduced to a fair rate.

Very few things in this world are absolutely essential to an individual; in many cases, he can get along very well with something else, and a substitute not being available, he can upon a pinch go without altogether.

But the consumer has very little protection against the inferior goods and the deceptions that invariably follow in the wake of ruinous and often unscrupulous price-cutting competition. There can be nothing that is more demoralizing than this to both consumer and producer.

In this connection, there is now a bill before Congress, which, if it becomes a law, will prevent manufacturers from controlling the resale prices of patented articles. It is of course intended for public protection, but it is likely to result in public injury. It will of course result in ruinous price-cutting, trade demoralization and inferior goods, and this is invariably a public detriment and inimical to the interests of the consumer.

Take automobile accessories, for illustration. Their distribution is at present largely based upon price and consequent quality maintenance. This is the case with such standard articles as the Victor Talking Machine, the Eastman Kodak, the Bissell Carpet Sweeper, the Gillette Safety Razor, the Ingersoll Watch and others that might be mentioned. These would undoubtedly have been sold at a less price at retail, under the price-cutting system, but it would soon result in decidedly inferior goods.

There is thus no reason why a strong and concerted movement should not be made against this resale bill. Without some control over prices by manufacturers, it is almost impossible in this age of rapid production and the consequent sharp selling competition, to prevent price-cutting and the evils which always finally follow in its wake.

It appears that the bill has awakened those interested in other lines of production, and they have their representatives in Washington trying to defeat it, but there is a lack of concentrated effort or action in the

automobile accessory trade, although if they were to work together, the bill might be defeated.

There are, as stated, two sides to this question, but the strong side and the important side to consumers as well as to manufacturers and inventors is that trade should not be allowed to become demoralized by ruinous price-cutting and inferior quality.

Bolts Are Not Strong Enough.

From O. H. Hampton, Indiana.—The writer has personal knowledge of three instances where the bolts broke which hold the two halves of the connecting rod bearings on the crank together, and allowed the connecting rod to come free from the crank. As these breaks occurred on machines belonging to the writer and he paid the bill for repairs, he feels that he knows what he is talking about.

The damage done, as might have been expected, was a good deal and some besides. In the worst of the three cases, the crank shaft was bent and twisted out of shape, the connecting rod bent, battered and twisted, the crank case bottom knocked into little bits, a large piece broken from one piston, and a smaller one from another. The cap on top of the crank case was cracked, the cam shaft broken, one cylinder broken, to say nothing of minor breaks, bruising and crackings. The timer, spark plugs and one cylinder were all that remained intact of a motor that two seconds previously was working beautifully.

One of the other motors was damaged so it was not worth repairing and the third one was worth repairing. The writer knows of three other cases of the same kind, all doing more or less damage. Three of these breaks were on motors of the same make and it is hardly necessary to say that there was something radically wrong in the construction of this make of motor, and as to the others—well, the bolts broke. It may be supposed that as the motor does its work altogether by pushing, that there would not be much strain on these bolts, but it is to be remembered that when a motor is running 1,000 R. P. M., the crank gives the connecting rod bearing a severe pulling jerk in reversing the piston movement. The metal in the broken bolts appeared to be crystallized, looking much like broken cast iron. Running a motor with loose connecting rod bearings would be giving the bolts severe jerkings and vibrations; millions of them in a short time.

The only apparent remedy is to use bolts of larger diameter made from the toughest obtainable metal, and if such a thing is possible, a non-crystallizing metal, and at frequent intervals put in new bolts, however good the old ones appear to be. A bolt or other piece of metal that is crystallized appears to be as good as it ever was, and may at the same time be so badly crystallized that it is liable to snap the next time the motor is started.

Light Oil for Motor Trucks.

From Francis P. Ellicott, chief of technical department, Wm. C. Robinson & Son Co., Maryland.—As oil manufacturers we have daily sessions with the problems and questions put up to us by the great army of commercial and pleasure car owners looking for efficient lubrication. This one is a frequent visitor—"Is a different oil than that used in pleasure vehicles necessary for motor truck lubrication?"—and following close upon this question some manufacturer announces in glowing terms his introduction of a "special" lubricant designed especially for motor truck

service. It may be special—the can surely is—but as for the oil—enough said.

Lubrication as a factor in commercial motor service is not to be despised. On it can rest the decision as to whether a flotilla of 20 or 30 trucks is an asset or a liability or make or unmake new commercial vehicle advocates. The matter is worth serious consideration.

These facts have been sifted out of the day's work and pretty nearly show the consensus of opinion between motor truck owners and motor truck manufacturers. To these we have to say that the same grade and quality of oil can be utilized for both commercial and pleasure vehicles. This applies to the standard cars—well known makes that represent 90 per cent. of the motor trucks in use. An oil with the excess carbon producing elements removed and with a viscosity of 200 degrees at 100 degrees Fahrenheit, will give ideal and efficient lubrication for either class. It is as adaptable for one as the other.

Quite a bit of stock has been exploded in the theory "because a commercial truck motor is heavier than a pleasure car motor—therefore a heavier oil." In fact there is a distinct advantage in a lighter bodied oil for both winter and summer use. The force feed lubrication system will feed with less attention and more consistently. You must remember that the driver of the average motor truck is expected to give delivery service—and that on schedule time. He cannot give the attention to details as does the man who tinkers with his own car, and the periods for overhauling are not as frequent. For the cold weather period a lighter bodied oil gives uniform satisfaction. Motor trucks are not very often "garaged" in ice houses, so it would appear that "zero" test oils are not necessary and are merely freaks of the refiners' art—robbing them of a considerable part of their lubricating qualities.

What is wanted is a moderate low cold test—sufficient to guard against average cold weather. When your motor is running you can be sure that your oil is lubricating efficiently—even though the temperature be very far below "zero." When a motor truck owner asks us to set him right as to the oil for his use we recommend without hesitancy Autoline No. 2, a light bodied oil. And we have found that in 98 per cent. of the cases we have prescribed correctly and have helped some man over his lubrication difficulties.

One Show, Two Buildings.

New York will have but one automobile show next Winter, and it will be so big as to make necessary the use of two buildings. This was settled definitely last week, when a contract was signed for the use of Madison Square Garden by the Automobile Board of Trade, which also has a lease on the new Grand Central Palace.

The combined shows will be held under the auspices of the Automobile Board of Trade, the exhibits being divided between the new Grand Central Palace and Madison Square Garden.

According to present plans, the shows will be open to all makers of motor cars and accessories, but the plan of allotting space has not been definitely settled. It is not unlikely that a single ticket will admit to both buildings with arrangements for conveniently transporting visitors from one building to the other.

ENGLISH AUTOMOBILE INDUSTRY.

The Business Was More Prosperous Last Year Than Ever Before and the Product was Increased.

The automobile manufacturing business is thriving in the United Kingdom, according to our consular reports, and the factories are increasing their product and facilities. Probably half the motor cars made there are produced within 25 miles of Birmingham. There is now some talk of a combination of British manufacturers to make possible the production of good cars in larger quantities at prices similar to those of the American cars. British manufacturers and capital, when they see a public demand discovered by foreign competitors, generally manage to meet that competition with considerable success. Frequently the foreigner has done the missionary work and reaped the first harvest, and then found his goods partly supplanted by British products of a similar type. Automatic machinery, machine tools, typewriters, and cash registers, however, are striking exceptions to this rather general rule.

American automobiles of the highest grade, equal to the best British or other makes, have not, with perhaps two or three exceptions, been introduced into the British market, as the American demand consumes all the product of the American factories turning out this grade of cars, while British purchasers prefer the British or Continental make.

There is as yet no British demand for electric automobiles. A few of this class are obtainable in London, but they are not up-to-date, compared with the American types. There is probably but one British firm now making electric automobiles. Several firms turn out gasoline-electric vehicles, which are employed to a small extent on railways and promise to come into wider use. There is not and never has been any large demand for electric automobiles in England, as the gasoline car is preferred, and seems to meet all requirements.

Private companies and municipal authorities selling electricity have given little attention to increasing the demand for current by making low rates for charging batteries, establishing charging stations, and going after this potential business in a serious way. Before electric vehicles can be successfully introduced electricity for charging purposes must be made generally available. Because of their design and efficiency American electric automobiles may ultimately succeed in the United Kingdom, but British makers are then certain to produce similar types, with slight changes intended to make them more suitable for the British market.

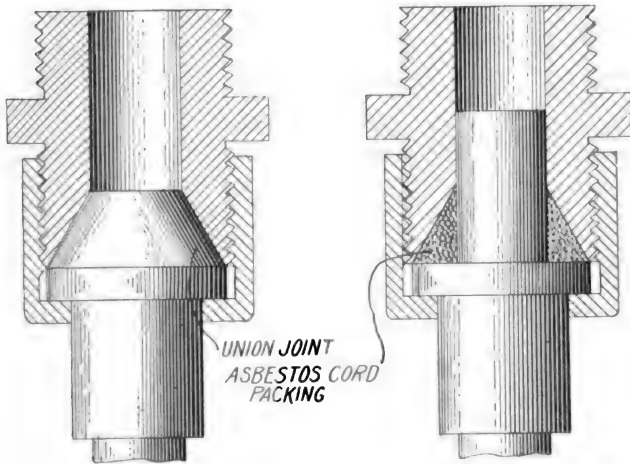
British makers of commercial motors last year had more than they could do to keep pace with the demand, and many new companies engaged in this line of manufacture. One of the principal passenger motor car makers in Birmingham is about to build commercial cars as well. American commercial motors have made little headway in the United Kingdom, though one company that uses its passenger chassis with a special body is steadily increasing its sales for light delivery purposes, while another light delivery wagon, such as is used by the department stores in the United States, is offered for sale. None of the latter are to be seen in Birmingham. British manufacturers of commercial vehicles and British technical papers assert that the heavy British commercial motor is superior to any made in the United States.

The increase of \$81,233 in the exports of motor cars

and parts from Birmingham to the United States represented almost entirely shipments of the Knight sleeveless-valve engines and parts and adopted by one of the large automobile works in Coventry. The engines shipped are used by several American manufacturers, and such shipments are not unlikely to decrease as their manufacture in the United States increases.

A Union Joint.

Trouble is often experienced with the usual type of cone union joint owing to the difficulty in making it oil, gasoline, or airtight. The type of joint to which reference is made is shown on the left hand of the accompanying sketch. On the right hand of the same sketch is a view of a modified form of joint which has been found extremely satisfactory. This is shown in part section, and it will be noticed that the coned portion of the sleeve on the pipe has been turned away and the remainder moved slightly back so that a little more length of the pipe is exposed. To make a good joint the exposed end of the pipe is pushed into the union end a little way, and some asbestos cord packing is then twisted round the pipe between the



Making a Tight Joint.

union end and the sleeve. If the union nut be screwed in place the asbestos cord will be firmly wedged into the portion of the union previously occupied by the cone. This method not only secures a tight joint, but relieves the union nut of some strain, for the extended end of the pipe entering a bore of the threaded union forms a firm register, so aiding the nut in retaining the alignment of the pipe and the union.

Danger of Gasoline.

From Gas Power: It is often quite difficult to get persons to understand that gasoline of itself in its fluid state is not explosive. That it depends altogether on the air and a certain proportionate mixture with it for its explosive character.

Where gasoline becomes dangerous as an explosive is when a whole room full of air tightly closed takes up gasoline fumes, as from cleaning carpets, to the explosive mixture point, or the air in an empty gasoline can which is only partly full of gasoline, is saturated with fumes, then a lighted match will cause a terrific explosion because of the large volume of air in the former and because of the want of strength sufficient in the walls of the gasoline can to withstand the pressure of the explosion in the latter.

No one should use gasoline for cleaning or other pur-

poses, unconfined, in a closed and tight room. Always have the doors and windows open wide at such time and there will be no danger. Gasoline is not dangerous in a room when it is confined in an air tight can or bottle, unless it becomes warmed to the degree when it will vaporize in the can then the pressure within may cause the can to burst or explode.

Lighting your cigar while looking into or holding a lighted match over the opening of your gasoline tank in your automobile to see if there is any gasoline in it, are unwarranted acts of carelessness. Beware of cigars and matches around a partially filled gasoline can or tank.

STEAM CAR DEPARTMENT

This department is intended for owners, users and others interested in the steam car.

Those who have trouble with their steam cars are asked to give clear and full particulars, and their queries will be answered as correctly as possible by an expert. It will be considered a favor if our readers will contribute to this department, giving such information as may be useful to others using the steam car.

WHITE AND STANLEY.

Dr. Wight Gives Interesting Information About Burners and Kerosene Fuel.

From J. Harris Wight, Massachusetts.—I note that Henry T. Tierney, Conn., says about water glasses. I ran a Grout touring car one season and the Klinger water glass blew out twice. I fitted a Seabury glass and not once did it ever trouble me. I think I had to re-set one glass once owing to leaking, but after this was fitted on the car, I never gave the glass second thought on the road. I carried 400 and sometimes 450 on both glasses, using a 19 inch boiler.

I have used kerosene in my steamers for 11 years now and I have never experienced the flooding of a burner as yet going down grade as Mr. Henshaw states. If one is sure his pilot is O. K. when he starts out this cannot happen. No man running a steamer should ever allow his car to be fired without a perfect pilot which is a very easy thing to keep clean, and he then can never have any trouble with it. I have known of several cars getting afire badly, just on poor pilots, and gasoline was used in the car at that. Kerosene to me is just as easy to vaporize as gasoline and has not in years caused me any trouble. Only one point, as I can see, to oil burning; the first fuel let into the burner cools the vaporizer and one wants to open and close the fire valve several times as it will stop the first rush of the oil and will soon heat the vaporizers. After that as long as the pilot is going the vaporizer will stay hot, even if the car stands for hours. I have owned several steamers and did a great deal of traveling long distances, and not once have I ever been laid up by burning kerosene.

I am now running a large White car on oil and this is my second one and not once have I in the past three seasons had any trouble with the kerosene.

J. J. Davis, of Texas, wants to know how to burn oil in a Model O White steamer. It is as easy as can be. If his car has the one tank only on the rear he must fit it as I have two White cars, and am running one that way now. I fit a 3 gallon tank in front under the foot board. Of course the tank can be put anywhere, as far as that goes. Then take the oil line and disconnect it at the union before the gasoline strainer. Leave the strainer where it is. Now run this pipe by

piecing it out to the oil line by cutting open the pipe and fitting a piece of solid pipe in, so the gasoline will not pass into this pipe when firing up. Put some kind of a strainer on the oil line. Now run a $\frac{1}{4}$ copper or $\frac{1}{8}$ brass pipe from his extra tank he put into this gasoline strainer so he can burn gasoline in his pilot as this White burner will not burn oil nor can it be made to. If he does not understand this, if he cares to write me, I will try and outline it for him. Send letter to Northampton, Mass.

I have given this to hundreds of users of steam cars but no doubt Mr. Davis has not seen it. As for the repair part catalogue, it looks to me as if the high price they ask for them would hurt the sales. To my mind one downfall of this car, is that it is too costly for a good many. I have owned one with a flow motor and one without. The one without was a very simple car, and I had no trouble to speak of with it, but the one with the flow motor would stick any man, and knowing cars as I do for 11 years past, and having rebuilt several from end to end, after some time trying to overcome my trouble, found it was in the flow motor as they sent it out. The man that packed the flow motor needle, had packed it so tight that it would not let the motor act as it should. After a long time, doing all I could think of, I found the cause, and after repacking the needle so loose it would play easy, my car ran just as nice as the day I got it and has ever since. I never had this experience till I changed the flow motor and would strongly advise any one changing the motor to be sure to look here for trouble in case the new flow motor does not work right. My car back-fired badly. This stopped it at once, as the needle comes to seat now. Fire would go out on hills and sometime would not come on for a half mile.

I can honestly say I like the flash boilers best. But one thing, the White cars are not light like the Stanley cars, and when it comes to repairs there is no car of any description equal to the Stanley steamer. The life of these cars is way past any other car I have ever seen. The White cars are more on the gas car line in weight and costly repairs. No doubt the White steamer is a more costly car to make several times over and its parts are more costly, so in this respect one cannot expect to run them as cheap as the Stanley car. For my part I have owned two of these cars and I think I can say no man ever ran a car any cheaper, as for cost about all I have ever spent in the two and a half years is for fuel. I know \$25 will cover all the parts I ever bought. As for tires I use the 20th Century leather covers and my tire troubles are none and my tire expense is only the cost of the covers. I have bought but one shoe in three years. My last car I got August 2, 1911, and up to date have not spent anything on tires or tubes. My tires under the covers never go down on me.

I know some claim protectors ruin a tire and make a car run hard, but I have used them four years and know it is no such thing. I would not think of running my cars without them. I would not be monkeying like most are on the road all day with old tires. I cannot understand where one gets fun enough out of a car to fool day after day with tires as I see them do on the road. It would make me sell out.

One other point. I note a Mr. Dresser advises me to write to the Stanley people. Well, as I have known them ever since they made cars, and have run their cars and worked on them, I am quite sure I know all the ins and outs of a Stanley car. I am a great lover

of the Stanley steamer, but I like the flash boiler best. I may yet run one. I have owned several types of this kind of car, and rebuilt them, and burnt kerosene in every one at that with good results. I can give him the address of a man making an oil burner that will use less fuel than his Stanley burner will in the pilot.

Wants to Hear From the Manufacturer.

From W. E. Hemenway, Warsaw, New York.—In the editorial comments on Mr. C. H. Dresser's article, "More Good Steam Car Reading," which appeared in your May issue, I find these words: " * * * there are so few of them in use and they seem to be growing less in proportion to the whole in use." And again: "The steam car is going out and the gasoline car is coming in," and I would ask; is there anything strange about this?

I have been interested in steam all my life and am much interested in the steam car department of your journal. We have no steam cars in our vicinity that I know of. In the last five or six years I have not seen over five or six steam cars, although the town today is full, so to speak, of gasoline cars. About two years ago a White steamer was seen on our streets and everyone marveled at the ease with which it could be handled, and the quietness with which it got under way. But all our expert garage men allowed that it was "no good;" that it cost too much to run, and was almost impossible to keep in running order, etc., etc.

I think I am safe in saying that one cannot pick up a magazine without finding advertisements of gasoline cars. The daily papers with which I am familiar are full, so to speak, of such ads. It seems nothing out of the ordinary nowadays to pick up a little town paper that circulates only through the smallest community and there find a half page devoted to advertising some particular make of gasoline car. Now I may be defective in sight, but as yet I have failed to notice one single advertisement of a steam car.

Hardly a year ago I undertook to investigate steam cars with a view to purchasing. By inquiry among my acquaintances I succeeded at last in locating two concerns that were manufacturing steam cars, and wrote for catalogues, which arrived in due season. One of these firms wrote me a quite formal letter in answer to my request for a catalogue, saying: "Our catalogue will be sent you in a few days, but we have no agent in your vicinity that we will trust to handle our cars and do not care to take the matter up ourselves," or words to that effect. Of course, under these conditions I buy a gasoline car. Why not?

And now, Mr. Editor, I would ask, why this attitude on the part of the steam car people? And what is to hinder the steam car from going down and out under such conditions? The manufacturer's side of the question would be interesting to me.

Note—Although the matter has been gone over pretty well in these columns before, the underlying cause for the decline of the steam car is as stated. But whether it would have held its own with the gasoline cars even if it had been aggressively pushed is uncertain. At the outset it was allowed to enter the races in competition with the gasoline car, but at that time it proved such a sure winner that it was soon barred out. Whether it would prove more speedy than the gasoline car of today is another matter, but quite likely one might be constructed—even as the freak racing gasoline car is constructed—that

would still be invincible as to speed. But this constant comparison of the gasoline and the steam car is useless. It is a good deal like comparing a pair of low shoes with high ones, of a water color painting with one painted in oil, of a frock coat with a sack coat—it is largely a matter of taste or use. Although the increased or the lessened use of a certain thing is not proof of its superiority or its inferiority, it is surely evidence of it. We have in mind a man who owns a White steamer of somewhat ancient date. It originally cost \$4,000; he paid \$400 for it. He has two bright boys—twins of about 18 years, by the way—who have a mechanical turn of mind and they take pleasure in keeping the car tuned up and in good order. It gives splendid service, and will do anything or go anywhere with any load that can be carried with a gasoline car and at a better speed than most gasoline cars. Now this is strong evidence in favor of the steam car. But what of the evidence of the original owner who was glad to sell a car for \$400 that cost him \$4,000?

White Steamer Pointers.

From Otto F. Frengel, Ohio.—I would like to make a few suggestions. First, the White Steamer that was noted some time ago, as "jangled and out of tune." I am quite sure his trouble is based on a dirty boiler. If he will go to a grocery store and get ten cents worth of salsoda and put about one-third of it in enough water to fill the boiler, let it dissolve, then separate the waterline at the hand pump leaving the pump connected to the boiler and put a hose, or take in a pail of the solution, open the blow-off valve on the right-hand side and pump the solution into the boiler until it comes out at the blow-off valve, warm it up by starting the pilot and turning on the main fire, then let it stand for a day and fire up and blow it out; follow up with some clean water. If not enough repeat the operation. If there is not much oil on the water in the supply tank, or drain the tank and fill with clean water you can put the salsoda in the tank thus not having to brake the waterline but be sure to get all the salsoda out of the tank and piping by cleaning and pumping clean water through the system as it would not be a very good oil in the engine. I have done this on two occasions, and after cleaning these boilers they steamed like new and did not give any more trouble.

After cleaning the boiler set the water regulator to "trip between three hundred fifty pounds and four hundred pounds and the thermostat set as explained in the last issue, you should have more steam than you could use. Be sure the checks in the pumps do not leak, and that there are no leaks in the pipe line.

One reader asks if an engine would pull any more load with a thirteen inch pulley than it would with a twenty-six inch pulley.

The engine will develop a certain amount of power and whether it will pull any more load depends upon the driven pulley. If the driven pulley was made quite as large for the twenty six inch as the one for the thirteen inch pulley the amount of load would be the same but the belt speed would be higher. But if the driven pulley remained the same for both engine pulleys, the amount of load would be less owing to the increased speed of the driven pulley, and the speed of the engine remaining the same.

In the case of the under and over belt the engine would pull the same, but pulling on the under belt would transfer more power because the slack belt

would be on top and sagging in the center would cause the belt to follow the circumference of the pulley a little farther; while pulling on the upper belt would allow the slack under belt to drop away from the pulleys.

I think a system of signaling with the horn or whistle on the automobile, with all steam and electric railroads, would save a lot of accidents at railroad crossings. Every car driver should be able to give and understand railroad signals. In two cases autos were smashed and people killed because one train had gone, and the car was driven on the track in front of another. One was where an auto stopped and let a local car pass, then ran on the track in front of baggage car on an intersuburban road. The time of the two cars was so close that the motorman on the local should have given a first section signal, then the driver of the car would have known that another car was coming and would have looked for it, had he been able to give and understand signals. I believe railroaders would signal to autos and horsedrawn rigs if the people knew what they meant in cases where there was two sections of a train, or another train running on close time or one coming from the other direction, where the driver could not see it. It would be handy to use them in the cities with electric cars and at street corners. I know some of them, and find them to be a great help at grade crossings where there is shifting being done in the yards.

Uses White Steamers.

From M. R. Dimon, Illinois.—Myself and two brothers have White steam cars. We get the best of satisfaction from these machines burning the lowest grade kerosene for fuel. We have good roads most of the time but go wherever we want to with the White. We always keep our vaporizer clean, pilot working good, clean the water tank often and keep the generator well blown out. Of course the gas car is handier for short runs but the steam car counts on the long runs over all kinds of roads. Two of these machines are 1907 models on which we put the kerosene burners ourselves, and the other an 1908 model.

Repairs for the Stanley.

From A. N. H., New York.—Mr. Bert Foster, of South Dakota, will find all the questions he asks on page 74 of the February number, satisfactorily answered in the book of directions for operating the Stanley steam car, and the price list of parts, both of which should be in the hands of every Stanley owner. The Stanley Motor Carriage Company, of Newton, Mass., will send them to owners of their cars on application.

Temperature for Vulcanizing.

From C. S. Viall, 19 East 111th St., Chicago, Illinois.—In regard to No. 842, from Mr. Wyman, I would suggest he decrease his temperature to 260 degrees and not over 265 degrees. The time is all right for small patches. If his vulcanizer is a dry heat, electric, gasoline, alcohol or gas, and not water, he is burning the rubber. Ask him if his patch is not hard and cracks open. If so, it is burned. The stock used also has a good deal to do with the result. Mr. Wyman can send me a small sample and I can quickly tell if it is good or not as we have a complete vulcanizing plant.

Handle your car with care and use common sense. The life of a car will be much longer and repairs less.

Advises the Use of a Truss.

From C. S. Viall, Illinois.—In regard to No. 846, I think Mr. Warner is a little mistaken about the truss on the Ford. I have had trouble with Ford, Krit, Rambler and Mitchell cars that have no torsion rods and depend upon the tube to take the strains, and would recommend to any one the Gardner truss. And let me reply to the reply on No. 863 and ask, why does Ford insist on the rear engine support? This is certainly a poor way of holding an engine in the frame or even the front support of the Ford engine, and the placing of the spacing rod bracket for the front wheels under the engine is another bad fault.

New Advertising Manager.

Announcement has been made of the appointment of Berry Rockwell as general advertising manager of the United States Motor Company to succeed Gridley Adams, resigned. Mr. Rockwell is one of the

pioneer advertising men in the automobile field, having been advertising manager of the Maxwell-Briscoe Motor Company before the formation of the United States Motor Company. Since then he has been advertising manager of the Maxwell division. In his new capacity, Mr. Rockwell will have general supervision of all advertising of the Maxwell, Columbia, Stoddard-Dayton, Brush and Courier motor cars and Sampson motor trucks.

A Handy Book.

The B. F. Goodrich Co., Akron, Ohio, has a book for the pocket, containing pages for a record of miles, garages, hotels, roads, etc., for automobile trips, pages for incidents by the way, and much valuable information about the use and repair of pneumatic tires. Probably this firm will send one of these books free to those who ask for them and mention this magazine.

An Improved Lathe.

The Barnes Drill Co., Rockford, Illinois, which is well known as a most reliable and substantial firm, has made some important improvements in their 14-24 extension bed gap lathe. These improvements will appeal to the practical automobile man who has a great variety of work to do, and who desires that it shall be done quickly, easily and at the least possible cost. This lathe is now supplied with larger spindles and cones and geared feed box, as well as other improvements. It is a strong and well built machine and will handle

etc. The manufacturers claim that "Men-do" will save from 50 per cent. to 90 per cent. tire and tube upkeep. It is for sale by dealers and jobbers generally or will be sent prepaid upon receipt of price. Consult the advertisement of this company on another page and write to them.

The Waymaker Horn.—This horn is manufactured by the Lee Tire and Rubber Company of Conshohocken, Penna., and will be found described and illustrated in our advertising department. Dealers should write at once for terms as this company is advertising the "Way-

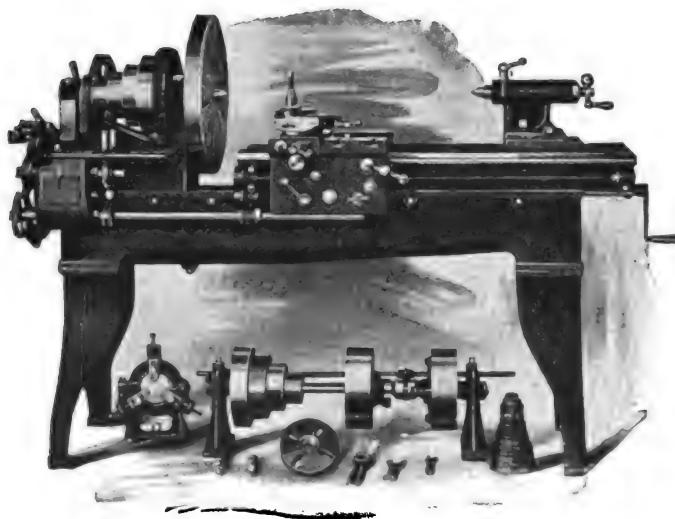
will give satisfaction wherever they are used.

Jericho Horn.—Motorists who want to be on the safe side will appreciate, of course, the importance of having their cars equipped with a warning signal that will secure the desired result. It should be, of course, a signal that will compel attention but not necessarily frighten people. In other words, it should be an effective signal. The "Jericho" horn is said to be that sort of a signal. This horn is adapted to all sizes of cars from the smallest runabout to the most expensive touring car, and is made in several sizes to fit the range of horsepower. It is made by the Randall-Faichney Co., Boston, Mass., a company that enjoys an enviable reputation in commercial circles. The "Jericho" is operated by a foot pedal, which leaves both hands of the operator free. When possible the operating pedal should be so placed that the driver of the car may sound the horn while using the same foot for clutch or brake.

Thumswitch Trouble Finder.—The McGill Mfg. Company, 88 Oak Street, Valparaiso, Ind., manufacture the Thumswitch Trouble Finder, which is illustrated and described in our advertising department. They say "don't use a match or candle to hunt trouble about a car. It is dangerous and unnecessary." The Thumswitch attaches easily to any battery and offers a safe, quick and easy way. This device is said to be a quick and profitable seller for dealers, garage owners and supply houses. Write for discount and catalogue to the company as above.

Several Good Things for Automobile Owners.—We have recently received from the Gray-Hawley Mfg. Company, 937 Jefferson Avenue, Detroit, Mich., their latest catalogue of accessories for motor cars also their catalogue of accessories for motor boats. The Motor Car Catalogue contains particulars of the Gray muffler cutout, the Gray lock pedal, the Gray muffler foot pedal, the Gray autochime whistle, etc. This catalogue gives full particulars of all the devices manufactured by this company and will be sent free to every reader who will write for it.

Storage Batteries.—The American Battery Company, 1136 Fulton Street, Chicago, Ill., manufacture all styles of storage batteries for automobiles. See their announcement on another page and write to them for further particulars and prices.



The New 14-24 inch Lathe.

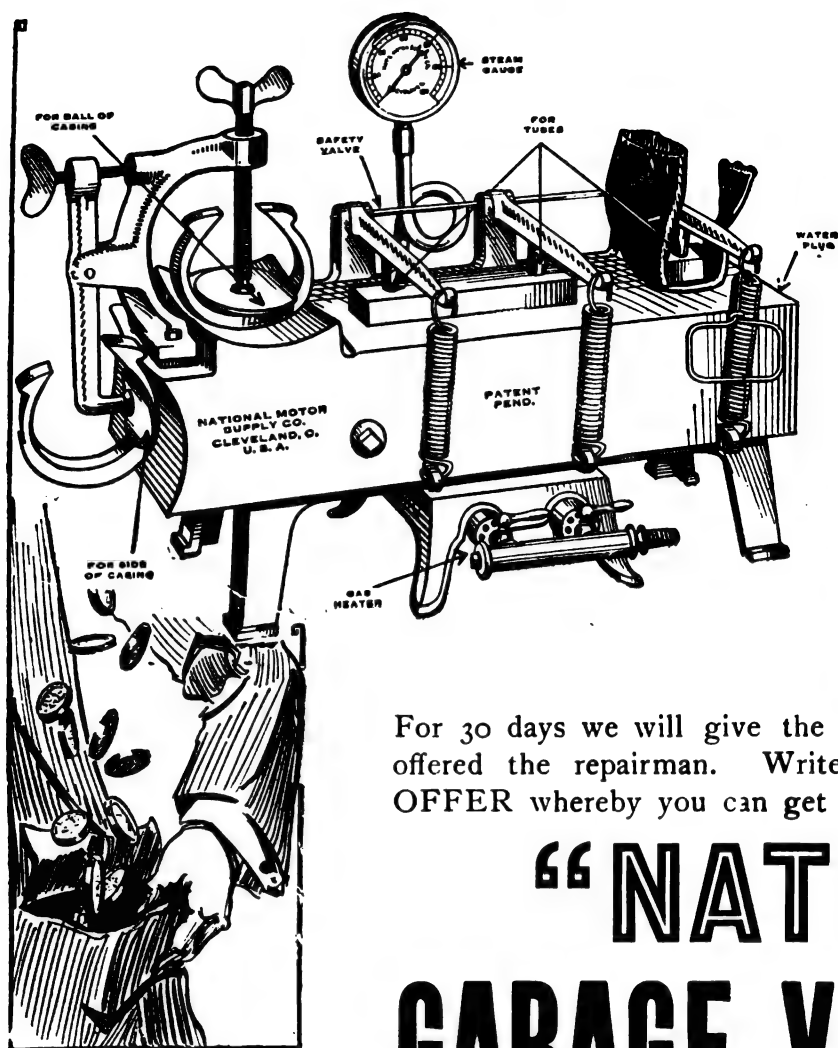
a wide range of work. The drill is illustrated herewith. For automobiles and general repair work, we know of nothing that is more convenient or better. For price and complete particulars address the Barnes Drill Co., Rockford, Illinois, and mention this magazine.

To Agents and Manufacturers.—The Sturdy Mfg. Company, 2639 Michigan Avenue, Chicago, Ill., will give exclusive sales rights on what they call a motor necessity that has been successfully marketed for five years. See their advertisement on another page and write to them at once for full particulars.

"M. W."—This preparation is manufactured by the Liberty Rubber Company of Orange, N. J., and it repairs inner tubes, outer casings, horn bulbs,

maker" horn extensively in automobile journals, magazines and papers of very large general circulation. It looks as though it was going to be a big seller. Write at once for special trade proposition, descriptive booklet "I." and the "Waymaker" data book.

Blowers and Drills.—In this issue the Canedy-Otto Mfg. Company of Chicago Heights, Ill., have a full page announcement with illustrations of blowers, forges and drills. Jobbers and supply houses generally sell their tools but their 160 page tool catalogue will be sent free to every reader who will cut the coupon out of their advertisement, fill it in and send it to them. The Canedy-Otto goods have been on the market for a quarter of a century or more and have acquired a high reputation. These goods



NOTICE TO GARAGES

For 30 days we will give the **BIGGEST BARGAIN** ever offered the repairman. Write us immediately for our **SPECIAL OFFER** whereby you can get one of our famous

“NATIONAL” GARAGE VULCANIZERS

and our **BIG BARGAIN** by making only a small deposit, and pay the balance in sixty days. **NO ONE CAN AFFORD TO MISS THIS.**

The “NATIONAL” will vulcanize three tubes and two casings at a time, and is heated by either gas or gasoline. It is the best and cheapest vulcanizer on the market, as hundreds of our customers will tell you. **WRITE TODAY, AND GET YOUR SHARE OF PROFITS.**



“National” Portable Steam Vulcanizer for Individual Car Owners

Make one tire outwear three with our machine. It will vulcanize both tubes and casings of any size. Can be used in the country or anywhere. **STEAM** eliminates the danger of burning the tire. The “National” is nothing new and untried. Nearly 30,000 satisfied customers. It is the original and only perfect steam vulcanizer for the individual owner. Like everything else that is good, it has its inferior imitators. Beware of them! Price with full instructions and all supplies, **\$12.00.**

FREE TRIAL Send us bank references, and we will ship you promptly complete outfit. Try it on your own tires yourself for ten days. If it is not entirely satisfactory and the best investment you ever made, send it back. That's fair! But we know we will get the \$12.00, as you would not part with the “National” for three times its cost after you know what it will do for you. Write for agent's proposition.

Be sure to state which vulcanizer you would want.

THE NATIONAL MOTOR SUPPLY CO.

Home Office and Factory: 1903 EUCLID AVE., CLEVELAND, O.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

The Automizer.

This is a new device, which when attached to the carburetor of almost any car made, will, it is claimed, make a great saving in gasoline besides increasing power and preventing carbonization. The makers claim that more than one thousand careful tests show an average increase of 35 per cent. mileage by use of this attachment. The "Automizer" has no movable parts, hence:—there is no wear out to it and although built on scientific principles, it is so simple that most people after seeing say, "It's a wonder someone did not think of that before." The Automizer transforms every particle of gasoline passing through the carburetor into a finer mist, mixes it properly and then sends the



Saves Gas and Increases Power.*

mixture in a whirling volume to the combustion chambers. The mixture thus formed is so highly combustible that in firing, the engine gets the maximum force of the explosion, thereby giving you full rated horse power; also prevents carbon. Every Automizer is put out with a strong guarantee: money refunded if not as represented. Dealers should write for trade prices or a sample complete and ready for use will be mailed prepaid on receipt of one dollar. It is simple and easy to put on. The car owner with a wrench and ten minutes' work can get just as good results as the master mechanic. Send your orders and inquiries to the Automizer Co., Canton, O. and mention this magazine.

Sealo Treatment.—The Sealo Tire Company, Dept. J20, 1409 Michigan Avenue, Chicago, Ill., say in their advertisement in this issue, if you pick up a nail just pull it out and ride ahead if your tires have been treated with "Sealo." You simply squirt a can of "Sealo" into each tire, which you can easily do and then the manufacturers say you can forget all about puncture troubles. A written guarantee goes with every "Sealo" treatment. But consult the advertisement of this company, cut out the coupon attached and send it to them for a copy of their "Sealo" Tire Book free of charge. This company has a very attractive proposition to make to dealers who are requested to write to them.

Mossberg Socket Wrench Set.—Many of our readers will be interested in the half page announcement in this issue of Frank Mossberg & Company of Attleboro, Mass., manufacturers of the No. 10 Universal Automobile Set. This set comprises Mossberg ratchet handle No. 350, one extension bar, one universal joint, two screwdriver bits, 19 mottled, case hardened, pressed steel sockets and two special spark plug sockets. But consult the advertisement and write at once for Catalogue No. 143. This company stands behind all goods stamped with their trade mark, "M" in the center of a large diamond with a positive guarantee to replace anything that breaks.

New Heel Plate to Prevent Wearing of Matting.—One of the latest accessories to make its appearance on the counters of dealers and supply men is a heel plate to prevent the wearing of unsightly holes in the floor covering back of the pedals or to cover up any holes that may already be there. This plate is made of special extra heavy tough aluminum, six by ten inches in size with one-quarter inch pyramids to prevent slipping and has a beautiful white satin finish which makes it an ornament to any car. It can be easily attached to a car and car owners who have used it are enthusiastic in its praise. For further particulars concerning this device write to the Metallic Automobile Matting Company, 295 Mill Street, Rochester, N. Y.

The Stryker Muffler Cutout.

To run an automobile without a muffler cutout, or with one whose outlet area is not equal to the area of the exhaust pipe, or fitted with a valve which in any way interferes with the free discharge of the exhaust, is wasteful both of fuel and engine. Simplicity of construction is very important. The points to be demanded are compactness, simplicity, effectiveness and durability. For best results it is important to have all the working parts on the outside, and all on one side; the cutout must be made in



The Stryker Muffler Cutout. Patented, May 28, 1912.

two parts, with three point support; and of material that will expand and contract with the exhaust pipe. A cutout to give the best service must be made for the size exhaust pipe on which it is to be used.

The Stryker Muffler Cutout is built for efficiency—it relieves 100 per cent. of the back pressure from the muffler. There is a pattern for each individual size. This eliminates all extra weight and insures a perfect fit without brazing or packing. The "Stryker" is not affected by mud or dirt. It will not carbonize, and it never has to be cleaned. It gives the engine snap and ginger, makes it flexible, increases the power,

and tells instantly when every cylinder is doing full duty. Stryker Muffler Cutout is made by C. W. Stryker, Syracuse, N. Y. request Mr. Stryker will mail you circular giving you considerable information on muffler cutouts.

Vulcanizer Temperature Control.

In last month's issue there was a description of the thermostatic temperature control of the Shaler Vulcanizer. The manufacturer's C. A. Shaler Co., Waupun, Wis. illustrations were omitted and we felt that an injustice may have been done.



Fig. 1.

Fig. 1 shows the Shaler at work on a tube, Fig. 2 its method of attachment to an inflated casing, and Fig. 3 a cross section of the apparatus.

The function of the thermostatic temperature control is to maintain the temperature of the vulcanizer at the correct vulcanizing point automatically and

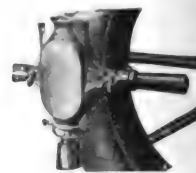


Fig. 2.

without the exercise of constant vigilance on the part of the operator to prevent overheating and damaging the tire. The thermostat accomplishes this purpose by opening and closing a damper which regulates the draft, consequently the intensity of the flame. As it is only necessary to light the alcohol lamp in order to have the temperature of the vulcanizer

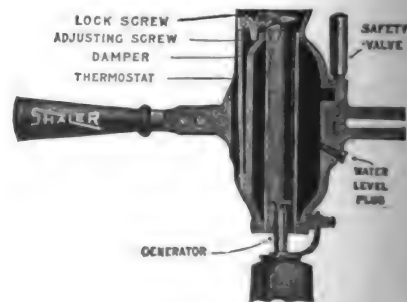


Fig. 3.

run up to the vulcanizing point and remain there indefinitely, the operator can heat the vulcanizer while preparing the repair, then put it on the tire and leave it without further attention until the repair is finished. This feature is original and exclusive with the Shaler.

Subscribe to the "Automobile Dealer and Repairer," \$1.00 Per Year.

WARNING-A-FLIM-FLAM

IF YOU FLIM-FLAM THE PUBLIC
YOU FLIM-FLAM YOURSELF

DON'T BE MISLED BY

UNSCRUPULOUS JOBBERS & DEALERS
WHO REPRESENT
MOSLER'S CONICAL TYPE PLUG

PACKED IN THIS BOX
FOR THE PUBLIC'S PROTECTION



AS A GENUINE MOSLER SPIT-FIRE PLUG
CONICAL PLUGS ARE MANUFACTURED UNDER OUR PATENTS
BUT THEY ARE NOT A GENUINE CLOSED-END

SPIT-FIRE PLUG LIKE THIS



SPIT-FIRE Plugs Shoot A Flame
SPIT-FIRE Plugs Have A Deep Chamber
SPIT-FIRE Plugs Use A Petticoat Porcelain
SPIT-FIRE Plugs With Platinum Point Last Longest

Insist that the Mosler SPIT-FIRE Plugs you buy
Are Packed
in a Box like this



Use Genuine SPIT-FIRE Plugs - If you expect
the best results from your Motor

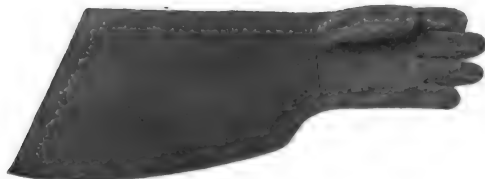
A.R. MOSLER & CO.,
P.O. BOX "M"
MT. VERNON, N.Y.

83

WE OWN THE LARGEST FACTORY IN THE WORLD DEVOTED EXCLUSIVELY TO THE MANUFACTURE OF SPARK PLUGS

The M. & E. Repair Glove.

This glove is designed to thoroughly protect the hands, cuffs and coatsleeves from dirt and grease in doing repair work around an automobile. It is made of a new oilskin fabric treated by a new process which makes it greaseproof and practically waterproof. It is also strong and durable. The hand of the glove is soft, while the cuff is lined with a firm smooth finished fabric and reaches to the elbow. One pair may save many dollars' worth of clothing and every car owner who drives his own car, as well as every repair man should certainly have a pair. The cut gives some idea of the appearance of these gloves. A pair of these



Grease Proof Glove.

gloves will be sent prepaid for \$1.00 to any reader who will send this amount to the manufacturers, McHose & Euck Mfg. Co., Ashland, Ohio, and mention this magazine. Dealers are also requested to write for trade price, as this glove is a great seller.

Marble's Pocket Screw Driver.—This is a little tool that every auto owner can carry in his vest pocket to good advantage. It embodies also a Prest-o-Lite key, three long blades that lock open separately, each blade differing in width from the others. This tool is made by the Marble Arms & Mfg. Co., Gladstone, Mich., a company that the writer of this notice has been acquainted with for a dozen years or more. He can vouch for the good quality of every tool which this company makes. The leading idea since this company started has been "quality," and no attempt has ever been made to sacrifice quality to cheapness. This company would like to send its 60 page catalogue of devices of all kinds for hunters, fishermen, campers and motorists, to any reader of this paper who may be interested. Whatever you get bearing the name of "Marble" will always be good and the best that experience and skill can turn out.

One Thousand Dealers Wanted.—The R. C. H. Corporation, 191 Lyncaste Street, Detroit, Mich., occupy the whole of our back cover page in this issue with an announcement of two of their cars, the "Standard" Model and Model "E E." They want dealers everywhere to write to them at once for specially attractive terms. If any dealer is dissatisfied with the car he is now selling or the treatment he gets from the manufacturer here is a good chance to change for a car that will be pushed vigorously. The R. C. H. Corp. is alive from one end to the other and the man who gets an agency for their cars will profit by so doing. But read their advertisement carefully and then write to them.

Buffum Tools.—The advertisement of the Buffum Tool Company of Louisiana, Mo., gives a description of three different tools of interest to an automobilist. One is the Buffum valve lifter, the other is the Buffum cotter pin holder and the other one is the Buffum oil can holder. All of these can be used to advantage by a motorist and any one of them will be sent promptly on receipt of the price. This company manufactures hundreds of

kinds of tools for the trade. Their slogan is "High-grade tools for high-grade workmen." Dealers everywhere sell the tools manufactured by this company.

A Gas Leak Detector.—It is claimed that 50 per cent. of all the cars have leaky gas systems and that at least 25 per cent. of the acetylene gas is wasted. The Auto Appliance Mfg. Co., of Akron, O., have recently brought out a simple gas line testing device that they are marketing for the exceedingly low price of 50 cents, prepaid. The appliance, like many things made in Akron, is constructed of rubber, using a small gas bag with a tube leading from either side, the end of which is equipped with

hard rubber tips. The operation is very simple and a leak in the line is readily detected. Needless to say that a ready market awaits an apparatus of this kind because the detection of the smallest leak in the gas line will soon save twice the cost of the appliance.

McIntyre "F" 12.—In our advertising department will be found briefly described and illustrated the latest design of car made by the W. H. McIntyre Company, 2102 W. 7th Street, Auburn, Ind. We recommend our readers to write to them at once for proposition for 1913.

New Exhaust Horn.—Aermore Mfg. Co., 1536 Michigan Boulevard, Chicago, Ill., has an announcement in this issue illustrating and briefly calling attention to what they call "the loudest and most musical warning signal on the market for automobiles, motor boats and motor cycles." They say they have an exhaust horn that cannot clog and that it has the right sound to attract attention. Write at once to the address above for catalogue giving prices and full particulars.

Dealers Who Think should read the full page announcement in this issue of the Hudson Motor Car Company, 7350 Jefferson Avenue, Detroit, Mich. 1913 contracts are now being made and the plans of this company are said to be extremely attractive. But consult the advertisement on another page and write for further particulars mentioning The Automobile Dealer and Repairer.

Hemmeter Spark Gap.—This spark gap it is said will keep your plugs clean and will make old plugs fire as good as new. It is manufactured by the Hemmeter Spark Gap Mfg. Company, of Pontiac, Mich. Write to them for further particulars and prices, mentioning The Automobile Dealer and Repairer.

"Nobby" Tread Wins.—We understand that the suit which has been pending against the Famous Nobby Tread Tire has been won by the United States Tire Company of New York City. Dealers are requested to cut their page advertisement out and paste it conspicuously in their windows. The United States Tire Company contends that Nobby Treads will stop skidding and everybody knows the danger of a skidding car.

The Rapid Auto Cleaner and Polish.—With this preparation you can clean and

polish your car without the use of water, so the manufacturer says. It is said that it will remove mud, grease, dust and spots of all kinds. Dealers are invited to send for special proposition and any reader can have a free sample who will write for it and mention this magazine. See advertisement on another page and write at once to T. R. Shannon, 19 Lorraine Street, Hartford, Conn.

Silver King Wrench Set.—This desirable set of wrenches is designed especially for automobile manufacturers by the C. M. B. Wrench Company, 910 F. Genesee Street, Syracuse, N. Y. These wrenches are for sale by dealers everywhere or ought to be. If your dealer does not keep them write direct to the company above for further particulars and prices.

New Hotel Directory.—There has been recently published a new hotel directory wherein 15,000 of the leading hotels of the United States and Canada are listed. Great effort has been made to make this publication reliable and up to date. It is classified in a way to make it easy of access, and all the information required is stated in a condensed and clear way. The print is large enough so that it can be easily read and the rates per day and whether it is American, European or combined plan, is given in each case. The price is \$1.00 and copies may be had by addressing the Hotel Monthly, 443 S. Dearborn St., Chicago, Ill.

Haight Auto Lighter.—With this device your lamps can be lighted, turned down or out while you are driving. It also does away with the match nuisance. For further particulars consult the advertisement of this company on another page, and write at once to the Haight Auto Lighter Co., Lansing, Mich.

The National Starter.—Every one is now interested in the problem of starting his automobile without resorting to the cranker. The National Gas Engine Starter Company, 30-32 No. Dearborn Street, Chicago, Ill., has a full page announcement in this issue describing its National Starter. With this starter you can not only start your automobile from your seat, but it insures you from the dangers connected with what they call the explosive principle. But consult the advertisement and you will learn the points of superiority in the National.

For Lighting the Automobile Lamps.—In the May issue mention was made of a little device for lighting automobile lamps without matches. This is made by the Auto Gas Lighting Co., Fountain City, Ind. It was stated that these lighters combined with burners retail for \$3.50 a pair; this was obviously an error. The price is but \$1.50 a pair, and it is a remarkable value and a remarkably handy and useful combination.

Send for free sample of The Automobile Dealer and Repairer.

MOTOR VEHICLE PUBLISHING CO.,
71-73 Murray St., New York.



Who recommended your lubricating oil? *That is vital*

Automobile lubricants are like automobile parts.

They must fit the car they are used on.

The correct oil can't be determined by simple tests. Most motorists must depend on advice.

Dealers who handle Gargoyle Mobiloil can give you the specific recommendations of the Vacuum Oil Company—the recognized leaders in lubrication.

We supply them with a guide chart (printed in part on the right). The chart was prepared after a careful analysis of every American car and practically every foreign make. It will show you the correct grade of lubricating oil for your car (summer and winter).

In power-engineering circles these recommendations from us would be accepted as authoritative. You may feel assured that, in quality, the oils specified on the chart set a world standard.

They are put up in barrels, half-barrels, and in 5 and 1 gallon sealed, white cans.

The oils (refined and filtered to remove free carbon) are named:

Gargoyle Mobiloil "A"
Gargoyle Mobiloil "B"
Gargoyle Mobiloil "D"
Gargoyle Mobiloil "E"
Gargoyle Mobiloil "Arctic"

All are branded with the Gargoyle, which is our mark of manufacture.

VACUUM OIL CO., Rochester, U. S. A.

General Sales Offices, 29 Broadway, New York City.

Distributing warehouses in principal cities of the world

A guide to correct Automobile lubrication

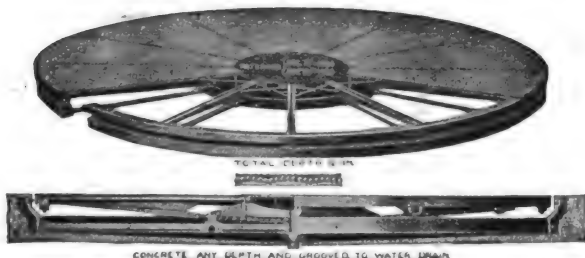
Explanation: In the schedule the letter opposite the car indicates the grade of Gargoyle Mobiloil that should be used. For example, "A" means "Gargoyle Mobiloil A," "Arc" means "Gargoyle Mobiloil Arctic." For all electric vehicles use Gargoyle Mobiloil A. The recommendations cover both pleasure and commercial vehicles unless otherwise noted.

MODEL OF	1908	1909	1910	1911	1912	
CARS	Summer	Winter	Summer	Winter	Summer	Winter
Abbott Detroit.	A	Arc	A	Arc	A	Arc
Alco.	A	Arc	A	Arc	A	Arc
Apperson.	A	Arc	A	Arc	A	Arc
Atlas.	A	Arc	A	Arc	A	Arc
Com'l.	A	Arc	A	Arc	A	Arc
Austin.	A	Arc	A	Arc	A	Arc
Autocar (2 cyl).	A	Arc	A	Arc	A	Arc
" (4 cyl) Com'l.	A	Arc	A	Arc	A	Arc
Borg.	A	Arc	A	Arc	A	Arc
Berglund.	A	Arc	A	Arc	A	Arc
Brush.	A	Arc	A	Arc	A	Arc
Buick (2 cyl).	A	Arc	A	Arc	A	Arc
" (4 cyl).	A	Arc	A	Arc	A	Arc
Cadillac (1 cyl).	A	Arc	A	Arc	A	Arc
" (4 cyl).	A	Arc	A	Arc	A	Arc
Carters.	A	Arc	A	Arc	A	Arc
Com'l.	A	Arc	A	Arc	A	Arc
Case.	A	Arc	A	Arc	A	Arc
Chadwick.	A	Arc	A	Arc	A	Arc
Chalmers.	A	Arc	A	Arc	A	Arc
Crisler.	A	Arc	A	Arc	A	Arc
Cole.	A	Arc	A	Arc	A	Arc
Columbia.	A	Arc	A	Arc	A	Arc
Columbia Knight.	A	Arc	A	Arc	A	Arc
Coupe.	A	Arc	A	Arc	A	Arc
Croston-Keston.	A	Arc	A	Arc	A	Arc
Daimler.	A	Arc	A	Arc	A	Arc
Daimler Knight.	A	Arc	A	Arc	A	Arc
Darracq.	A	Arc	A	Arc	A	Arc
De Dion.	A	Arc	A	Arc	A	Arc
Delahaye.	A	Arc	A	Arc	A	Arc
Delaney-Belleville.	A	Arc	A	Arc	A	Arc
Elmore.	A	Arc	A	Arc	A	Arc
E. M. F.	A	Arc	A	Arc	A	Arc
Fiat.	A	Arc	A	Arc	A	Arc
Flinders.	A	Arc	A	Arc	A	Arc
Ford.	A	Arc	A	Arc	A	Arc
Franklin.	A	Arc	A	Arc	A	Arc
Com'l.	A	Arc	A	Arc	A	Arc
Gramm.	A	Arc	A	Arc	A	Arc
Gramm-Logan.	A	Arc	A	Arc	A	Arc
Hewitt (2 cyl).	A	Arc	A	Arc	A	Arc
Hewitt (4 cyl).	A	Arc	A	Arc	A	Arc
Hudson.	A	Arc	A	Arc	A	Arc
Hupmobile.	A	Arc	A	Arc	A	Arc
International.	A	Arc	A	Arc	A	Arc
Interstate.	A	Arc	A	Arc	A	Arc
Isotta.	A	Arc	A	Arc	A	Arc
Itala.	A	Arc	A	Arc	A	Arc
Jackson (2 cyl).	A	Arc	A	Arc	A	Arc
" (4 cyl).	A	Arc	A	Arc	A	Arc
Kelly.	A	Arc	A	Arc	A	Arc
Kline Kar.	A	Arc	A	Arc	A	Arc
Com'l.	A	Arc	A	Arc	A	Arc
Kline Kar.	A	Arc	A	Arc	A	Arc
Knox.	A	Arc	A	Arc	A	Arc
Krit.	A	Arc	A	Arc	A	Arc
Lambert.	A	Arc	A	Arc	A	Arc
Com'l.	A	Arc	A	Arc	A	Arc
Lancia.	A	Arc	A	Arc	A	Arc
Locomobile.	A	Arc	A	Arc	A	Arc
Lozier.	A	Arc	A	Arc	A	Arc
Mack.	A	Arc	A	Arc	A	Arc
Marion.	A	Arc	A	Arc	A	Arc
Marmon.	A	Arc	A	Arc	A	Arc
Matheson.	A	Arc	A	Arc	A	Arc
Maxwell (2 cyl).	A	Arc	A	Arc	A	Arc
" (4 cyl).	A	Arc	A	Arc	A	Arc
Mercedes.	A	Arc	A	Arc	A	Arc
Mercedes Knight.	A	Arc	A	Arc	A	Arc
Mercer.	A	Arc	A	Arc	A	Arc
Minerva Knight.	A	Arc	A	Arc	A	Arc
Mitchell.	A	Arc	A	Arc	A	Arc
Moon.	A	Arc	A	Arc	A	Arc
National.	A	Arc	A	Arc	A	Arc
Oakland.	A	Arc	A	Arc	A	Arc
Oldsmobile.	A	Arc	A	Arc	A	Arc
Overland.	A	Arc	A	Arc	A	Arc
Packard.	A	Arc	A	Arc	A	Arc
Panhard.	A	Arc	A	Arc	A	Arc
Panhard Knight.	A	Arc	A	Arc	A	Arc
Peerless.	A	Arc	A	Arc	A	Arc
Pennsylvania.	A	Arc	A	Arc	A	Arc
Pierce Arrow.	A	Arc	A	Arc	A	Arc
Com'l.	A	Arc	A	Arc	A	Arc
Pope Hartford.	A	Arc	A	Arc	A	Arc
Premier.	A	Arc	A	Arc	A	Arc
Rambler.	A	Arc	A	Arc	A	Arc
Rapid.	A	Arc	A	Arc	A	Arc
Regal.	A	Arc	A	Arc	A	Arc
Renault.	A	Arc	A	Arc	A	Arc
Reo.	A	Arc	A	Arc	A	Arc
Royal Tourist.	A	Arc	A	Arc	A	Arc
Selden.	A	Arc	A	Arc	A	Arc
Simplex.	A	Arc	A	Arc	A	Arc
Speedwell.	A	Arc	A	Arc	A	Arc
Stanley.	A	Arc	A	Arc	A	Arc
Stearns.	A	Arc	A	Arc	A	Arc
Stearns Knight.	A	Arc	A	Arc	A	Arc
Stevens Duryea.	A	Arc	A	Arc	A	Arc
Stoddard Dayton.	A	Arc	A	Arc	A	Arc
Stoddard Dayton Knight.	A	Arc	A	Arc	A	Arc
Thomas.	A	Arc	A	Arc	A	Arc
Walter.	A	Arc	A	Arc	A	Arc
Welch.	A	Arc	A	Arc	A	Arc
Welch Detroit.	A	Arc	A	Arc	A	Arc
White (Gas).	A	Arc	A	Arc	A	Arc
" (Steam).	A	Arc	A	Arc	A	Arc
Winton.	A	Arc	A	Arc	A	Arc

Labor Saving Devices.

In a letter recently received from the Canton Foundry & Machine Company, Canton, Ohio, they advise that their auto accessories department is now made up of three great labor-saving conveniences for the garage, both public and private: namely, their "universal" automobile turntable, "Universal" auto-jack and emergency truck and "the handiest tool in the shop," portable floor crane and hoist.

The "Universal" automobile turntable is made in four sizes, so as to take care of any size and weight car from the lightest runabout to the heaviest touring car or truck. The top plates are braced underneath and the whole construction strong and durable. All parts



The Universal Turntable.

are made of best iron and steel, nothing intricate. The table is but 12 inches in depth, making it possible to install same in either ground or upper floors.

Their combination auto-jack and emergency truck is made of wrought iron, steel and cast iron and it has been tested under all makes of cars. The jack can be lowered to 9 inches and elevated to any height desired. With this jack it is possible to elevate both front wheels or both rear wheels off of the floor at one time and when supported on jack, car can be moved around in garage to any desired position. It is a very powerful machine, yet the operation is extremely simple and does away with the backbreaking annoyance of the old jacks.

Their "handiest tool in the shop," portable floor crane and hoist is, as its name implies. It is used extensively in garages for lifting engines in and out. It also has many other usages in a garage.

Those interested in any of these machines will do well to write to the Canton Foundry & Machine Co., Canton, Ohio, for literature and prices. They are a reputable firm, having been in business for over twenty years and stand back of every machine they put out. In writing them, kindly make mention of The Automobile Dealer and Repairer.

Aermore Truck Horn.—The Aermore Mfg. Company, 1536 Michigan Blvd., Chicago, Ill., is making a specialty of what they call their Big 4 No. 1 Horn for commercial trucks and vehicles. This horn is said to have a pure and distinct tone and to be reasonable in price. It is easy to attach and there is no upkeep cost involved. It is self-cleaning and cannot clog. Further particulars can be obtained by writing to the company as above and mentioning The Automobile Dealer and Repairer.

Get Their Catalog.—The W. E. Pruden Hardware Co., 864 Eighth Ave., New York City, are sole agents for Atlas Brake Lining and Wepco braided lining. They will also supply you with A. I. A. M. cap-screws and nuts, phosphor, vanadium and "Nongran" bushings and solids, bearing metals, steels, etc.,

also a full line of general garage supplies. Readers are urged to send to this house for their interesting free catalogue, not forgetting to mention The Automobile Dealer and Repairer.

The Sypher Magnetic Lifting Tool.—This magnetic lifting tool is used for taking out nuts, cotter pins, bolts or tools that have been dropped into the crank case or transmission case. It is operated on two or four dry cells or storage battery. It is said by the manufacturers of this tool that it will pay for itself on one job. It never wears out. Every garage could use one of these tools to advantage as well as every repair man. Dealers are invited to send for descriptive circular and special discounts. It is said by the manufacturers

to be a great seller. Those interested should write at once to the Sypher Mfg. Company, 2208 Warren Street, Toledo, Ohio.

Superior Leather Varnish.—The Triumph Chemical Company, of Milwaukee, Wis., manufacture what they call Superior Leather Varnish for automobiles, carriage and buggy seats and tops. It is said this varnish will stand the sun and rain in any climate and will not crack or blister. It can be applied with an ordinary brush and dries in 30 minutes. Send for price list and mention The Automobile Dealer and Repairer.

"For Your Motor's Sake."—We have received from Wm. C. Robinson & Son, Co., 1509-15 Thames St., Baltimore, Md., a little booklet entitled "For Your Motor's Sake," which gives some points about lubrication of value to every owner of an automobile. We understand that one of these booklets will be forwarded free of charge to any reader who will take the trouble to write for it. It is worth sending for.

We understand that the Wesco Supply Co., of St. Louis, Mo., has made arrangements to act as distributors of the Hagstrom Spark Plug and other Hagstrom specialties in St. Louis, during the coming season.

Don't Waste Time Polishing.—The Gun Metal Finish Co., Decatur, Illinois, have three preparations all of which can be used by motorists. One gives a bright gun metal finish, another a dull gun metal finish, and still another a glossy rubber finish. See their announcement on another page and write today for samples and prices. Mention The Automobile Dealer and Repairer.

Adamantine Screw Plates.—Our readers who use screw plates will probably serve their interests by sending for a catalog of the threading tools manufactured by the American Tap and Die Co., of Greenfield, Mass. See the advertisement of this company on another page and in writing to them mention The Automobile Dealer and Repairer.

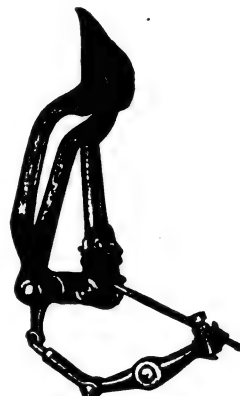
Duryea Motor Buggies.—In this issue will be found an announcement of C. D. Duryea Motor Co., Saginaw, Mich., de-

scribing a motor buggy manufactured by this company. These buggies run with solid tires. They have a perfected 2-cycle air cooled engine. They are said to be very economical to run as well as handsome in appearance, and prices are reasonable. Write for catalogue giving full particulars, and mention The Automobile Dealer and Repairer.

We have received from J. H. Williams & Co., 17 Richards Street, Brooklyn, N. Y., their really elegant 1912 catalog of drop forgings. It is a book of considerably over 100 pages, with numerous halftone illustrations on coated paper. It contains a great variety of wrenches and many wrench sets which dealers and repair men can use advantageously. This catalogue may be too expensive to send out indiscriminately, but if any one of our readers is especially interested, we presume he can have a copy by writing to the above address.

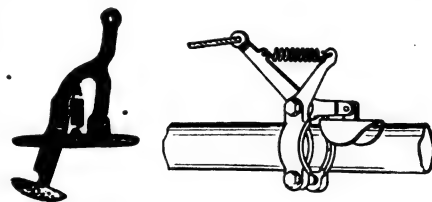
Specialties for Ford Car Owners.

The Auto Parts Co., of Providence, R. I., make a specialty of furnishing a variety of useful specialties for Ford cars. Some of these accessories are illustrated herewith. They make an automatic clutch release which will be found a help to the amateur and to all others, as to that matter. The price is nominal and if it is not satisfactory after



Automatic Clutch Release.

having been tried, the money will be refunded. They also make a new cutout which is guaranteed not to break and with which they supply a solid brass pedal that will hold the cutout open without holding the foot upon it. It is



Muffler Cutout and Pedal.

simple and efficient. Directions are given as to how it may be attached and the price, which is but \$1.50 prepaid, includes everything ready to go on the car. They have twenty other useful Ford specialties, and owners of these cars will do well to send for a free catalogue, addressing them as above.

Send for free sample of The Automobile Dealer and Repairer.

MOTOR VEHICLE PUBLISHING CO.,
71-73 Murray St., New York.

Index to Advertisers.

Adamson Mfg. Co., vulcanizers....3d cover	G. J. G. Motor Car Co., automobiles... 19	Security Co., patches .....117
Aermore Mfg. Co., signals.....113	Hagstrom Bros. Mfg. Co., spark plugs. 22	Seneca Falls Mfg. Co., lathes.....120
Alden Sampson Mfg. Co. (Sampson) automobiles..... 96	Haight Auto Lighter Co., ignition.....107	Shaler, C. A. Co., vulcanizers..... 8
Alden Sampson Mfg. Co. (Sampson) (35) automobiles..... 96	Harris, A. W., Oil Co., oil..... 90	Shannon, T. R., polish.....116
Allen Auto Specialty Co., tire gauges...105	Hart & Wilder Co., pumps.....109	Splitdorf, C. F., magnetos .....119
American Battery Co., storage batteries 116	Haws, Geo. A., oil 20	Standard Woven Fabric Co., brake band lining 19
American Bolt & Screw Case Co., re-volving cases 22	Hawthorne Mfg. Co., pumps.....109	Stanley, John T., soap..... 23
American Electric Co., signals.....116	Haywood Tire & Equipment Co., vul-canizers .....119	Standard Brass & Iron Works, bumpers 109
American Tap & Die Co., screw plates. 14	Hemmeter Spark Gap Mfg. Co., spark gaps .....113	Star Speedometer Co., speedometers... 11
American Tire & Rubber Co., cement...118	Hess-Bright Mfg. Co., ball bearings...104	Steam Carriage Boiler Co., boilers.....109
Armiger Chemical Co., polish 26	Hickok Mfg. Co., monograms.....116	Stoddard-Dayton, automobiles..... 96
Arsenal Varnish Co., varnish 13	Hinckley Machine Works, milling at-tachments 120	Stryker, C. W., cutouts..... 30
Atlas Auto Supply Co., repair outfits	Hodge & Graves Co., automobile seats 112	Sturdy Mfg. Co., 19
Atlas Chain Co., tire chains.....113	Holzman Auto Supply Co., supplies...109	Superior Motor Specialty Co., spark plugs 96
Atwater Kent Mfg. Works, ignition... 97	Horsey Mfg. Co., patches 25	Sypher Mfg. Co., tools..... 17
Auburn Auto Pump Co., pumps 16	Hub Machine Welding & Contracting Co., welding 13	35 Per Cent. Automobile Supply Co., supplies 95
Automizer Co., 83	Hudson Motor Car Co., automobiles... 88	Times Square Automobile Co., automo-biles 25
Automobile Advertising Co., advertise-ing service .....106	Inner Shoe Tire Co., tire lining..... 6	Tingley, C. O. & Co., patches..... 30
Automobile Supply Mfg. Co., signals..... 83	Inst. Lighter Co., ignition.....100	Tobey, Wm. L., rim removers..... 30
Automobile Tire Co., tires..... 29	Jeffrey-Dewitt Co., spark plugs..... 18	Toledo Auto Devices Co., putty..... 96
Auto Appliance Mfg. Co., gas leak de-tectors .....107	Johns, H. W., Manville Co., asbestos fabrics and specialties, storage bat-teries .....19, 25	Triple-Tread Mfg. Co., treads.....103
Auto Directories Co., mailing lists...112	Jones, Phineas & Co., wheels.....118	Triumph Chemical Co., varnish.....113
Auto Parts Mfg. Co. (Milwaukee, Wis.) supplies 16	Keegan, Frank W., springs..... 96	Troy Auto Specialty Co., pumps.....107
Auto Parts Co. (Providence, R. I.) supplies 89	Kellom, Chas. F. & Co., oil..... 16	Tuthill Spring Co., springs..... 96
Auto-Tire Vulcanizing Co., vulcanizers 28	Kimball Tire Case Co., treads..... 30	20th Century Tire Protector Co., treads 14, 24
Baldwin Chain & Mfg. Co., chains..... 86	K-W Ignition Co., magnetos and spark coils 92	Underwood, H. B., & Co., cylinders re-bored 21
Barnes Drill Co., lathes .....119	K. W. Mfg. Co., tire lining.....2d cover	U. S. Compass Co., tools.....119
Barnes, W. F., & John Co., lathes.....116	Kroh, C. Z., Mfg. Co., tops.....116	United States Motor Co., automobiles 96
Battershall, F. W. & Co., gaskets.....119	Lansing Co., turntables.....111	United States Tire Co., tires..... 9
Benford Mfg. Co., timers and spark plugs .....108	Leather Tire Goods Co., treads..... 1	Universal Tire Protector Co., treads... 20
Best Ignition Equipment Co., spark plugs 32	Lee Tire & Rubber Co., signals.....117	Vacuum Oil Co., oil..... 79
Blackburn Specialty Co., locks.....109	Liberty Rubber Co., repair outfits..... 23	Valentine & Co., varnishes..... 5
Blackledge, John W., Mfg. Co., springs 30	Livingston Radiator & Mfg. Co., radi-ators 84	Vanderpool, Tire & Rubber Co., tires... 86
Blickensderfer, G. C., spark plugs..... 18	Lobe Pump & Machinery Co., pumps...111	Vanguard Mfg. Co., wind shields.....109
Borbein Auto Co., bodies .....112	McGill Mfg. Co., lamps..... 17	Voorhees Rubber Mfg. Co., tire lining 24
Breakstone, S., locks 7	McHose & Enck Mfg. Co., gloves..... 83	Waban Webbing Co., tire lining 96
Brennan Motor Mfg. Co., motors.....120	McIntyre, W. H. Co., automobiles.....116	Waterbury Welding Co., welding 27
Bricton Mfg. Co., treads..... 93	McLain, H. E. & Co., tire chains.....119	Watres Mfg. Co., signals..... 89
Bridgeport Brass Co., pumps.....105	MacKae Mfg. Co., terminals..... 29	Western Automobile Supply Co., inner casing 28
Brilliant Gas Lamp Co., gasoline light-ing system .....116	Maxwell-Briscoe Motor Co., automo-biles 96	Western Motor Co., motors.....109
Brown Co., pumps 32	Mayo Mfg. Co., pumps 87	Western Robe Mills, buggy washers... 24
Brush Runabout Co., automobiles..... 96	M. & M. Mfg. Co., repair outfits..... 23	Western Welding & Mfg. Co., welding 118
Buffalo Forge Co., tools 31	Mendenhall, C. S., road maps.....109	Whittaker Chain Tread Co., tire chains 111
Buffum Tool Co., tools 15	Metal Body Tank & Fender Co., sup-plices 13	Wiley & Russell Mfg. Co., screw plates, tools .....116
Butterfield & Co., screw plates..... 23	Metallic Automobile Matting Co., mat-ting .....117	Williams Foundry & Machine Co., re-pair outfits .....112
Buob & Scheu, auto tops..... 96	Michener, E. S., carbon remover.....111	Williams, J. H., & Co., drop forgings... 21
Canedy-Otto Mfg. Co., tools..... 91	Miller, Chas. E., vulcanizers..... 12	Williams Mfg. Co., repair outfits.....119
Canton Foundry & Machine Co., turn-ables and jacks .....108	Model Gas Engine Works, motors..... 18	Winchester Machine Works, tools .....107
Cartercar Co., automobiles..... 99	Modern Automatic Appliance Co., steer-ing device .....116	Woven Steel Hose & Rubber Co., brake band lining .....116
Catelain, A. G., hose clamps..... 96	Moller Bros. Controller & Economizer Co., fuel economizer.....107	Zacharias, E. H., motors.....112
Champion Blower & Forge Co., tools. 17	Montgomery Machine Co., vulcanizers.116	
Champion Spark Plug Co., spark plugs. 4	Moore, J. C., & Co., packs..... 27	
Clarke Carter Automobile Co., automo-biles .....111	Morris, R. W. Mfg. Co., polish.....29	
C-M-B Wrench Co., wrenches..... 96	Mosler, A. R. & Co., spark plugs..... 77	
Colorado Tire & Leather Co., treads... 3	Mossberg, Frank & Co., wrenches..... 15	
Columbia Motor Car Co., automobiles...96	Motor Accessories Makers, Inc., cem-ent .....109	
Comstock, Geo. S., compressors.....109	Motz Tire & Rubber Co., tires.....115	
Conover & Robinson, wind shields..... 96	National Gas Engine Starter Co., en-gine starters 2	
Courier, automobiles..... 96	National Motor Supply Co., vulcanizers 75	
Cray Bros., supplies 13	National Sales Corporation, brake band lining .....116	
Crone, F. G., pumps..... 96	New York Coil Co., ignition.....109	
Curtis & Co., Mfg. Co., pumps..... 14	New York & New Jersey Lubricant Co., oil .....101	
Davies, J. P. Co., soap..... 86	Northwestern Chemical Co., cement... 26	
Davis Robe & Armor Co., treads... 85	Oakland Advertising Co., paper weights and fobs .....115	
Dayton Inner Tire & Mfg. Co., tire lin-ing 28	Ofeldt, F. W., & Son, boilers.....109	
Dayton Motor Car Co., automobiles.....116	Olmsted's, L. H., Son, power hack saws 116	
Delta Mfg. Co., spark plugs.....116	O'Neill Tire & Protector Co., vulcanizers 116	
Diamond Rubber Co., tires, tire stock. 12	Packard Electric Co., ignition cables... 16	
Double-Fabric Tire Co., tire lining.....102	Page Lester Co., repair outfits..... 30	
Dover Stamping & Mfg. Co., funnels... 30	Peck, E. C., air inspirators.....115	
Draver Mfg. Co., cable supports..... 96	Peerless Accessories Mfrs., pumps.....118	
Duryea, Chas. D., & Co., automobiles...30	Perfect Mfg. Co., vehicle washers...111	
Edelmann, E., & Co., tire gauges..... 22	Phillips-Lafitte Co., brazing com-pounds 86	
Edgar Mfg. Co., signals.....109	Pitner Pump Co., pumps 22	
Empire Tire Co., tires .....111	Planhard Mfg. Co., carburetors .....119	
Endura Mfg. Co., fibre 26	Porter, H. K., bolt clippers..... 96	
Essex Rubber Co., tire lining..... 86	Prest-O-Lite Co., tanks, tubes..... 94	
Esterlin, E., Co., ignition..... 27	Pruden, W. E., Hardware Co., supplies 15	
Excelsior Tire Co., tires.....110	Quality Cement Co., cement.....117	
Felton Sibley & Co., varnishes..... 28	Queen Mfg. Co., treads..... 10	
Firestone Tire & Rubber Co., tire stock 114	Randall-Fachney Co., signals .....107	
Fisher & Norris, vices 16	R-C-H Corporation, automobiles...4th cover	
Garage Equipment Mfg. Co., supplies...118	Remy Electric Co., magnetos.....120	
Gardner Governor Co., air compressors 111	Richardson Tire Co., repair outfits... 97	
Gardner Engine Starter Co., trusses... 26	Robinson, Wm. C., & Sons Co., oil..... 27	
Gelsizer Bros., storage batteries.....109	Royal Equipment Co., brake band lining 98	
Gem City Liquid Vulcanizer Co., re-pair outfits 14	Sager, J. H. Co., shock absorber.....113	
Gibney, Jas. L. & Bro., vulcanizers...117	Sampson, automobiles..... 96	
Gilmer, Jr., G. Walker, pliers..... 29	Sanche, Dr. H., & Co.....118	
Goodrich, B. F., Co., tires..... 86	Scaife, Wm. B., & Sons Co., gasoline outfits .....117	
Grant, H. M., fibre 96	Schrader's A. Son, tire gauges..... 32	
Gray-Hawley Mfg. Co., cutouts..... 17	Schug Electric Mfg. Co., storage bat-teries 96	
Gray Specialty Co., reliners..... 31	Sealo Tire Co., cement..... 25	
Great American Rubber Co., tires.....115	Sebastian Lathe Co., lathes 24	
Grossman, E., Co., spark plugs.....111		
Guide Motor Lamp Mfg. Co., lamps...110		
Gun Metal Finish Co., polish 17		

Classified Buyers' Guide.

Advertising Service	
Automobile Advertising Co. ....106	
Air Compressors	
Gardner Governor Co. ....111	
Williams Foundry & Machine Co.....112	
Air Inspirators	
Peck, E. C. ....115	
Aluminum Cases Repaired	
Hub Machine Welding & Contracting Co. 13	
Aluminum Welding Composition	
Hub Machine Welding & Contract-ing Co. 13	
Asbestos Fabrics and Specialties	
Johns, H. W., Manville Co. ....19, 25	
Automobiles	
Alden Sampson Mfg. Co. (Sampson 35) 96	
Alden Sampson Mfg. Co. (Sampson) 96	
Brush Runabout Co. 96	
Cartercar Co. 99	
Clarke Carter Automobile Co.....111	
Columbia Motor Car Co..... 96	
Courier 96	
Dayton Motor Car Co. 96	
Duryea, C. D., Co..... 30	
G. J. G. Motor Car Co..... 19	
Hudson Motor Car Co..... 88	
Maxwell-Briscoe Motor Co..... 96	
McIntyre, W. H., Co.....116	
R-C-H Corporation .....4th cover	
Times Square Automobile Co..... 25	
United States Motor Co..... 96	
Automobile Seats	
Hodge & Graves Co.....112	
Ball Bearings	
Hess-Bright Mfg. Co..... 104	
Bodies	
Borbein Auto Co. ....112	
Boilers	
Ofeldt, F. W. & Son.....109	
Steam Carriage Boiler Co.....109	
Williams Foundry & Machine Co.....112	
Bolt Clippers	
Porter, H. K. 96	

Brake Band Lining		Lathes		Screw Drivers	
Johns, H. W. Manville Co.	19, 25	Barnes Drill Co.	119	Mac Kae Mfg. Co.	29
National Sales Corporation	116	Barnes, W. F. & John Co.	116	Shock Absorbers	
Royal Equipment Co.	98	Sebastian Lathe Co.	24	Sager, J. H., Co.	113
Standard Woven Fabric Co.	19	Seneca Falls Mfg. Co.	120	Signals	
Woven Steel Hose & Rubber Co.	116	Lock Washers		Aermore Mfg. Co.	113
Brazing Compounds		K.W. Ignition Co.	120	American Electric Co.	116
Phillips-Lafitte Co.	86	Remy Electric Co.	120	Automobile Supply Mfg. Co.	83
Brazing Powders		Magnetos		Edgar Mfg. Co.	109
Phillips-Lafitte Co.	86	K-W Ignition Co.	92	Lee Tire & Rubber Co.	117
Buggy Washers		Splitdorf, C. F.	119	Randall-Faichney Co.	107
Western Robe Mills	24	Mailing Lists		Troy Auto Specialty Co.	107
Bumpers		Auto Directories Co.	112	Watres Mfg. Co.	89
Standard Brass & Iron Works.	109	Maps		Soaps	
Troy Auto Specialty Co.	107	Mendenhall, C. S.	109	Davies, J. P. Co.	86
Cable Supports		Matting		Stanley, John T.	23
Draver Mfg. Co.	96	Metallic Automobile Matting Co.	117	Spark Gaps	
Carbon Removers		Milling Attachments		Hemmeter Spark Gap Mfg. Co.	113
Michener, E. S.	111	Hinckley Machine Works	120	Spark Plug Terminals	
Northwestern Chemical Co.	26	Monograms		Mac Kae Mfg. Co.	29
Prest-O-Lite Co.	94	Hickok Mfg. Co.	116	Spark Plug Protectors	
Carburetors		Motors		Mac Kae Mfg. Co.	29
Planhard Mfg. Co.	119	Brennan Motor Mfg. Co.	120	Spark Plugs	
Cement		Model Gas Engine Works	18	Best Ignition Equipment Co.	11
American Tire & Rubber Co.	118	Western Motor Co.	109	Blickensderfer, G. C. Co.	18
Motor Accessories Makers, Inc.	109	Zacharias, E. H.	112	Champion Spark Plug Co.	4
Northwestern Chemical Co.	26	Non-Conducting Coverings		Delta Mfg. Co.	116
Quality Cement Co.	117	Johns, H. W. Manville Co.	19, 25	Grossman, E., Co.	111
Sealo Tire Co.	25	Oil Gauges		Hagstrom Bros. Mfg. Co.	22
Chains		Troy Auto Specialty Co.	107	Jeffrey-Dewitt Co.	18
Baldwin Chain & Mfg. Co.	86	Oils		Mac Kae Mfg. Co.	29
Clutches		Harris, A. W., Oil Co.	90	Mosler, A. R. & Co.	77
Williams Foundry & Machine Co.	112	Haws, Geo. A.	20	Superior Motor Specialty Co.	96
Compressor		Kellom, Chas. F. & Co.	16	Speedometers	
Comstock, Geo. S.	109	New York & New Jersey Lubricant Co.	101	Star Speedometer Co.	11
Outlets		Robinson, Wm. C. & Son Co.	27	Springs	
Gray-Hawley Mfg. Co.	17	Vacuum Oil Co.	79	Blackledge, John W., Mfg. Co.	30
Stryker, C. W.	30	Paper Weights		Keegan, Frank W.	96
Cylinders Rebored		Oakland Advertising Co.	115	Tuthill Spring Co.	96
Underwood, H. B., & Co.	21	Patches		Steam Packings	
Detachable Treads		Gray Specialty Co.	31	Johns, H. W. Manville Co.	19, 25
Leather Tire Goods Co.		Horsey Mfg. Co.	25	Steering Devices	
Directories		Security Co.	117	Modern Automatic Appliance Co.	116
Auto Directories Co.	112	Tingley, C. O., & Co.		Storage Batteries	
Drop Forgings		Flies		American Battery Co.	116
Williams, J. H., & Co.	21	Gilmer, Jr., G. Walker.	29	Geisler Bros. Storage Battery Co.	109
Electrical Supplies		Polish		Johns, H. W. Manville Co.	19, 25
Johns, H. W., Manville Co.	19, 25	Armiger Chemical Co.	26	Schug Electric Mfg. Co.	96
Grant, H. M.	96	Gun Metal Finish Co.	17	Supplies	
Engine Starters		Morris, R. W. Mfg. Co.	29	Auto Parts Mfg. Co. (Milwaukee, Wis.)	16
National Gas Engine Starter Co.	2	Shannon, T. R.	116	Auto Parts Co. (Providence, R. I.)	89
Fibre		Power Hack Saws		Cray Bros.	13
Endura Mfg. Co.	26	Olmsted's, L. H., Son.	116	Garage Equipment Mfg. Co.	118
Fire-Proof Cements		Pumps		Holzman Auto Supply Co.	109
Johns, H. W. Manville Co.	19, 25	Auburn Auto Pump Co.	16	Metal Body Tank & Fender Co.	13
Friction Clutches		Bridgeport Brass Co.	105	Pruden, W. E., Hardware Co.	15
Williams Foundry & Machine Co.	112	Brown Co.	32	35 Per Cent. Automobile Supply Co.	96
Fuel Economizers		Crone, F. G.	96	Tanks	
Moller Bros. Control & Economizer Co.	107	Curtis & Co., Mfg. Co.	14	Prest-O-Lite Co.	94
Funnels		Gardner Governor Co.	14	Terminals	
Dover Stamping & Mfg. Co.	30	Hart & Widder Co.	109	Mac Kae Mfg. Co.	29
Gaskets		Hawthorne Mfg. Co.	109	Timers	
Battershall, F. W., & Co.	119	Lobee Pump & Machinery Co.	111	Benford Mfg. Co.	108
Gas Leak Detectors		Mayo Mfg. Co.	87	Mac Kae Mfg. Co.	29
Auto Appliance Mfg. Co.	107	Peerless Accessories Mfrs.	118	Tire Chains	
Gasoline Lighting System		Pitner Pump Co.	22	Atlas Chain Co.	113
Brilliant Gas Lamp Co.	116	Prest-O-Lite Co.	94	McLain, H. E. & Co.	119
Gasoline Storage Outfits		Troy Auto Specialty Co.	107	Whittaker Chain Tread Co.	111
Seafie, Wm. B., & Sons Co.	117	Putty		Tire Gauges	
Gloves		Toledo Auto Devices Co.	96	Allen Auto Specialty Co.	105
McHose & Enck Mfg. Co.	83	Radiators		Edelmann, E. & Co.	22
Hose Clamps		Livingston Radiator & Mfg. Co.	84	Schraeder's, A., Son.	
Catelain, A. G.	96	Radiators Repaired		Tires	
Ignition		Livingston Radiator & Mfg. Co.	84	Automobile Tire Co.	29
Atwater Kent Mfg. Works	97	Reeliners		Diamond Rubber Co.	12
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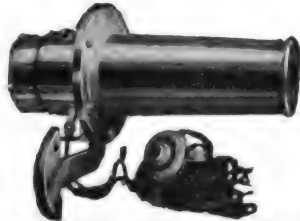
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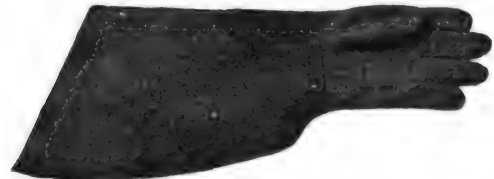
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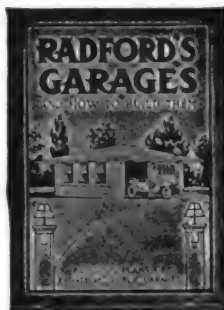
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55 DESIGNS OF GARAGES 55

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VANDERPOOL TIRE & RUBBER CO.
Springfield, Ohio

Upper Sandusky, O., Oct. 19, 1911.
Mr. Wm. Vanderpool, Springfield, Ohio.

Sir—Please send me at once one Columbia case, 32x3, by express. Find enclosed a P. O. money order for the whole amount. I ordered a tire some time ago and find that that they are all right.

Your customer,
 (Signed) **ARTHUR C. SCHOENBERGER,**
 384 W. Wyandotte Ave.

March 23, 1912.

Wm. Vanderpool, Springfield, Ohio.

My Dear Sir: Inclosed you find my check for \$55.45 for which please send me at once by express the following:

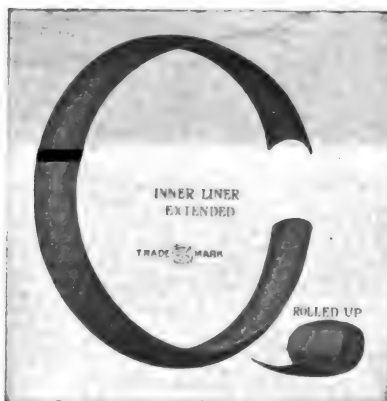
- 2 Columbia Casings, 32x3 1/2.
- 1 Columbia Casing, 31x4, clincher.
- 1 Tube, 32x3 1/2.

The casings and tubes I ordered some time ago are entirely satisfactory and have proven fully as good as the Goodrich that preceded them.

Respectfully,
 (Signed) **DR. E. E. RICE,**
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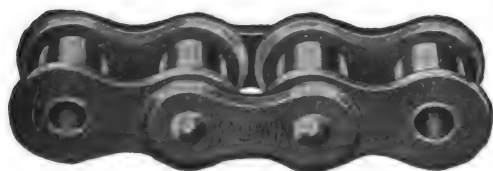
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Is adaptable for use on all four cycle motors of two, four or six cylinders, and offers at last a simple and practical way to inflate tires using **PURE, FRESH AIR** without the laborious, hard work of doing it by hand.

Simply remove a Spark Plug from any convenient cylinder and substitute the pump (with the hands only) is the advantageous method of attaching to all motors.

The cylinder used doesn't fire, therefore any spark plug can be utilized with either dual or single ignition system. If so desired, a valve cap may be tapped out and fitted with a permanent pet-cock, making it unnecessary to remove a spark plug in using.

The pumps work equally well on all sized cars, from the smallest Ford to the largest Lozier.

After connecting the hose from pump to tire, motor should be started and run on low throttle from two to four minutes, depending on the size of tire—maximum pressure obtainable, 150 pounds.

The pump is noiseless in operation and requires no attention whatever, other than an occasional drop of oil.

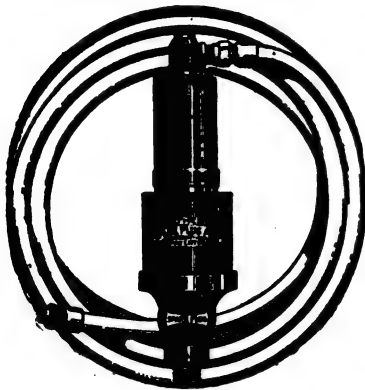
This pump is designed on a compound principle, **PURE, FRESH AIR** which is liberally supplied by the intake air valve being compounded to high pressure into the small barrel and thence forced to the tire.

The construction is simple and mechanically perfect throughout with no wearing parts to give trouble or get out of order. **Just like your engine, with metal rings—built to last as long as your car.**

Our Design makes this Pump Absolutely Indestructible. The pumping piston only operates when motor is run on low throttle and automatically locks when the engine is raced; again operating when the throttle is lowered.

An article that is small, light, compact, weighing only two and one-half pounds, which can be carried anywhere—always in working order and ready to use.

Our Selling Plan enables you to try this pump on your own car before purchasing. Furnished with adapters to fit any car and complete with 12 feet of superior hose and connections. **PRICE (Pressure Register \$2.00 extra), \$10.00**



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To Automobile Dealers Who Think

What are Your Plans for this Year?

The advancement of an industry is shown by the wrecks of the companies who participate in its progress.

This is true with all industries. Failures occur during the most prosperous times, just as they do during periods of panic.

What Failures Show

In 1910, 446 clothing manufacturers, for instance, failed. This in prosperous times. The liabilities totaled \$4,826,047.

Yet the big manufacturers grew. They were not affected. They felt no money stringency. They did not even feel the effect of severe competition. Their progress was made at the expense of the less competent—less successful makers.

That holds true with the automobile industry. Some manufacturers will continue to grow bigger. Theirs will be big lines. Companies manned by men of inexperience and insufficient capital will be unable to survive.

Even when the demand was great, there were many failures. But as competition becomes harder, as those successful makers develop their business and are able to eliminate wasted effort, it will be harder for the less competent. It is the same with men as with industries.

We are now closing agency arrangements for 1913. Our entire 1912 product was in

excess of 2,500 cars oversold and yet dealers were well cared for. Demand exceeded our estimates by that number. Just as we constantly scan the industry for the most efficient men—whether they be testers, machinists, superintendents or managers—we are as watchful for dealers who can make good.

Be Identified with a Success

This advertisement is merely to suggest that you note what the HUDSON has done each year of its career.

There has not been a single momentary stop or failure. Perhaps you, too, would like to be identified with its organization. At any rate, close observance of its progress indicates pretty thoroughly the advancement the industry is making.

Dealers Get Real Help Here

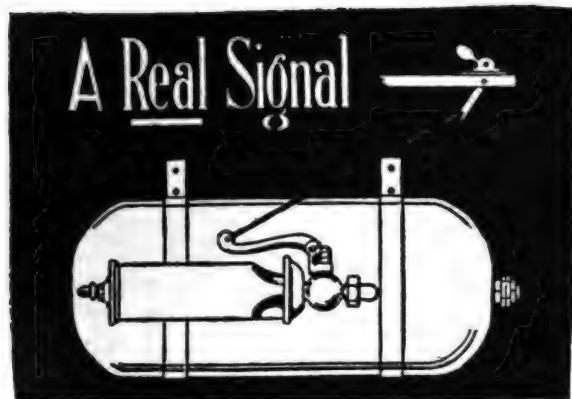
If you would like to know something of the unusual way in which the combined ability of this organization is made to aid its dealers, and think you live in a territory in which we need just such live, energetic and thorough representation as a thinking dealer such as yourself can give, please write at once.

1913 contracts are being made. Our plans are the most attractive we have ever had. They include a "Four" and a "Six," which you will admit when you have seen them, have no superior in quality, comfort and richness, in any car of their respective classes regardless of price. No man is too capable for us—none too aggressive. We want the best and are willing to make the proposition the best any one can demand.

The Money Making Line is neither the right car nor the right price nor the right merchandising. It is all of these combined in the right proportion.

HUDSON MOTOR CAR CO.

7350 Jefferson Ave., Detroit, Michigan



A new signal for Automobiles, but an old signal in service, the WATRES Power Whistle gives a powerful, compelling blast that cannot be ignored.

The ears of mankind are trained to take warning from a whistle. No other signal can have the same instant effect.

Among a multitude of new devices the power-whistle rings alone with its simple voice of command. Moreover, a whistle blown by stored pressure has from its very nature greater penetrating power than sound produced in any other way.

The WATRES Power Whistle is operated by burned gas from the engine stored in a small reservoir to which the whistle is connected. A touch of the foot pedal operates the whistle and the blast echoes a mile ahead.

Operated by stored power, the WATRES signal is always available. Coasting down hill or around corners or even with car stopped, the power is there—ready for a touch on the pedal.

With the WATRES Whistle goes an accumulator valve which screws into the pet cock opening of one cylinder; the reservoir, 7"x20", copper plated; a four-tone chime whistle, foot pedal and 6 ft. of flexible copper tubing.

We sell the WATRES whistle on a definite guarantee—satisfaction or money back after thirty days' trial.

Send at once for Booklet giving full particulars and price.

WATRES MANUFACTURING CO.

383 4th Ave., New York

We also make above equipment for motor boats. Send for special booklet.

FORD OWNERS



AUTOMATIC CLUTCH RELEASE

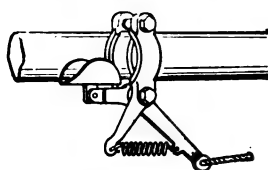
A simple device that automatically releases the clutch on the Model "T" Ford when the foot brake is applied. Pressure on the brake pedal releases the clutch *before* the brake is applied and if you wish to coast you simply push the brake pedal forward, which releases the clutch, and pushing the brake pedal farther forward applies the brake and brings the car to a standstill without the use of the emergency brake or the clutch pedal. This device will be found a great help to the amateur, as with it it is impossible to apply the brake without first throwing out the clutch, and in reversing the foot is always on the brake pedal to stop the car instantly without stalling the engine. Applying the brake without first throwing out the clutch wears the brake out quickly and puts a strain on the clutch that will cause it to slip after a few weeks' use. Our release can be put on your car in ten minutes with a screwdriver and is guaranteed to outlast the car. Put one on your car and if it is not entirely satisfactory after two weeks' trial you may return it and we will refund your money. Furnished complete with full directions.



PRICE \$2.00 EACH, PREPAID



MUFFLER CUT-OUT



Our 1912 Cut-out is the same design as our earlier type, but is made from malleable iron and guaranteed not to break, and with it we furnish a solid brass lock-open pedal that will

hold the Cut-out open without holding your foot on the pedal. Our Cut-out is efficient, simple and easy to install. Absolutely positive in action and will prevent bursting of muffler, will increase the power of the engine, and easily locate skips. To attach, cut 1 1/4-inch hole in exhaust pipe and clamp Cut-out in place, fasten pedal in floor board and connect with Cut-out by cable furnished. There is no question about a Cut-out being a good thing, and at our price you cannot afford to be without one. Including cable, brass lock-open pedal, screws, etc., ready to attach.

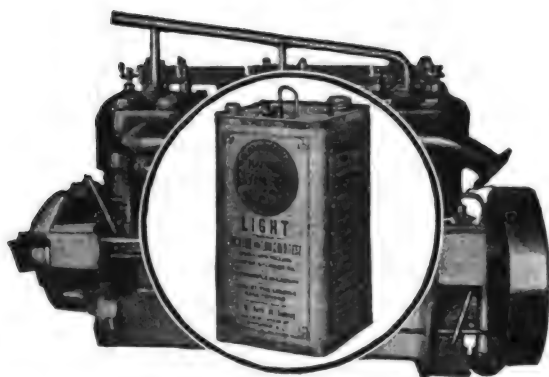
PRICE \$1.50, PREPAID

Twenty other Specialties for Ford Cars, carried in stock by most Ford Dealers. :: Free Catalog

AUTO PARTS CO.
Providence, R. I.

A Lubrication Combination That Is Supreme

HARRIS
TRADE MARK REG. U.S. PAT. OFF.
OILS



FOR CYLINDERS

HARRIS OILS are acknowledged to be the best. Their first cost (like all quality products) is a trifle more than you are asked to pay for the cheap, ordinary lubricant.

But they save many, many dollars and at the end of the season will prove by far, the most inexpensive lubricants you can buy.

This because, HARRIS OILS last longer—they give greatly increased mileage. The soot-deposit forming ingredients are removed to the greatest possible extent. Therefore cost for repairs is reduced to the minimum.

Added to this is the quiet, smooth-running motor, the added power, the freedom from all the ills that follow the use of ordinary motor lubricants.

HARRIS
TRADE MARK REG. U.S. PAT. OFF.
TRANS
COMPOUND



FOR TRANSMISSIONS AND GEARS

Many motorists use "grease" in the gears and transmission. "Grease" is all right for the old farm wagon axle, but not for fine machinery. You might just as well use soap.

HARRIS TRANS COMPOUND is a HEAVY OIL reduced to grease consistency. Therefore, it is all lubrication. Thick lubricating film of oil covering your gears all the time. Therefore it adds not only to the life of the gears, but it makes them mesh quickly and quietly.

When gear movement ceases, HARRIS TRANS COMPOUND regains its normal consistency in bottom of case, leaving a full, rich coated film of oil over the gears.

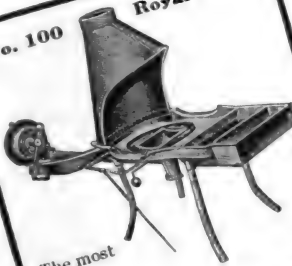
ASK YOUR DEALER.

A. W. HARRIS OIL COMPANY,

326 South Water St., PROVIDENCE, R. I.

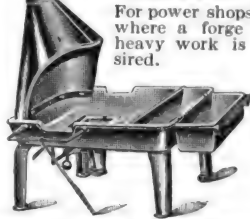
143 No. Wabash Ave., CHICAGO, ILL.

No. 100 Royal Forge



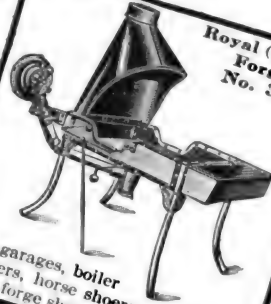
The most popular forge of to-day.

Western Chief Forge, Size XBB



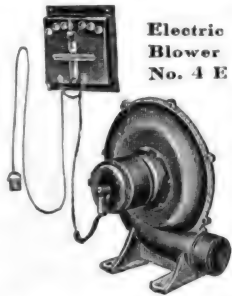
For power shops, or where a forge for heavy work is desired.

Royal (Steel) Forge No. 37



For garages, boiler makers, horse shoers or any first-class forge shop.

Electric Blower No. 4 E



One fire variable speed blower.

When the Name CANEDY-OTTO

is found on a Forge Blower, Drill or any other Blacksmith Tool that is all the guarantee necessary

We Warrant All Articles of Our Manufacture

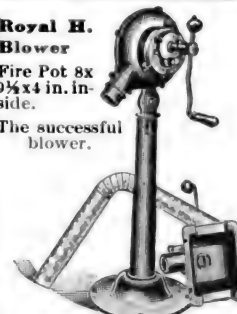
SOLD BY JOBBERS AND SUPPLY DEALERS EVERYWHERE

CANEDY-OTTO MFG.CO.
CHICAGO HEIGHTS, ILL.U.S.A.

Royal H. Blower

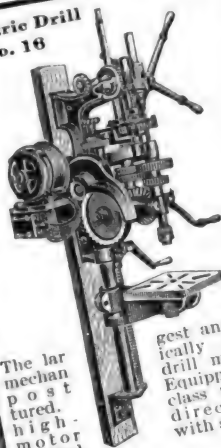
Fire Pot 8x 9 1/4 x 4 in. inside.

The successful blower.



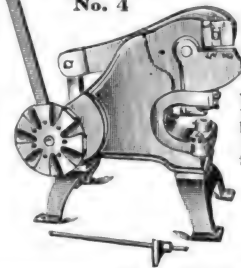
Spur gears used only. Ask the man who owns one.

Electric Drill No. 16



The largest and most perfect drill manufactured. Equipped with class powerful directly connected spur gear drive.

Combination Punch and Shear No. 4



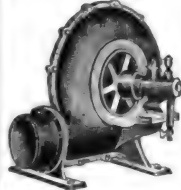
It can be operated toward the front or back. Depth of throat 6 inches.

No. 31 Drill



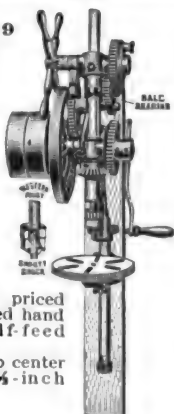
20-inch upright drill gear driven. No belts. Has hand lever feed, also power self feed with automatic stop.

Power Blower



Made in 5 sizes. Adapted to forge fires and light Cupola work. Built for service.

No. 19 Drill



A low priced combined hand and self-feed drill. Drills to center of 16 1/2-inch circle.

No. 1 1/2 Western Chief Tire and Axle Shrinker



The easiest operated shrinker in the world.

COUPON

CANEDY-OTTO MFG. CO.,
Chicago Heights, Ill.

Gentlemen:

Please send me a free copy of your 160-page Tool Catalogue.

Name _____

P. O. Address _____

State _____

Give name of your jobber or supply dealer here _____



18,000 FORD CARS ARE NOW EQUIPPED WITH MASTER VIBRATOR. WHY?

If the K-W Master Vibrator did nothing more than simply replace the four separate vibrators on a coil, it would still be worth every cent of \$15.00.

IT DOES A GREAT DEAL MORE.

It is so designed as to utilize the alternating current of the Ford Magneto and make the coil produce a MUCH HOTTER SPARK than it could produce with any other vibrator.

It is NOT A VIBRATOR in the ordinary sense but a scientifically constructed MAGNETIC CIRCUIT BREAKER which times the spark more accurately than the ordinary High Tension Magneto.

No matter what coil you now have, whether it has four vibrators or one, THE K W MASTER VIBRATOR will give you:

A HOTTER SPARK, preventing sooty plugs and carbonizing.
MORE POWER. It makes the hills "Fade Away."

EASY STARTING due to the hotter spark.

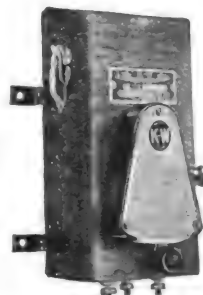
INCREASED SATISFACTION with your car.

EASILY PUT ON IN HALF AN HOUR, no changes in car necessary.

OUR GUARANTEE. If you feel that you can get along without it, return it within 30 days, - money back and no questions asked.

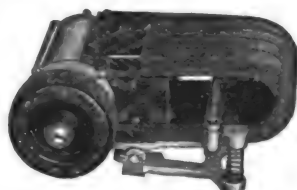
PRICE, \$15.00. Express prepaid if cash accompanies the order.

By the time this is printed there will be many more than 18,000 in use. The numbers run consecutively, and there are no blanks. Notice the number of the one you buy.



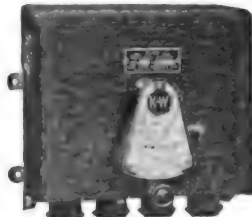
The K-W Electric Road Lighting Outfit \$50.00

This outfit is the same as our \$15.00 Ford Lighting Outfit with the addition of a \$35.00 Low Tension K-W Magneto, which can be mounted on almost any car to run the lights at night and can be switched off in the daytime or used for ignition with coil and timer. High Tension Magneto is for Ignition only.



Low Tension.....\$35.00

NO Moving Wires. NO Brushes.
NO Commutator. Runs in Ball Bearings. Starts engine without batteries.

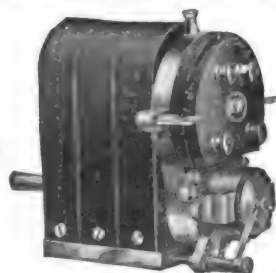


The K-W Spark Coil.

Single Cylinder.....	\$12.00
2-Cylinder.....	18.00
4-Cylinder.....	30.00
6-Cylinder.....	42.00

The K-W High Tension Magneto For any car having provision for Magneto.

Model J
Guaranteed
to Start Auto
Engines up
to 30 H. P.



No Coil
No Timer
No
Batteries
4 Cyl., \$50
6 Cyl., \$55

Extremely simple. Perfectly reliable.

We make larger Magnetos for larger engines.

If you cannot gear-drive a High Tension Magneto, use one of our \$35.00 Low Tension belt or friction-drive Magnetos and a K-W Spark Coil.

WRITE FOR DETAILS.

The FORD Electric Road Lighting Outfit \$15.00

Choice of Either Straight Body or Bullet Shaped Lamps.

THE SUCCESSOR TO THE GAS TANK. Current Direct from Magneto.



The K-W Outfits manufactured for this purpose are not makeshifts, but are complete in every detail.

The Outfit complete, which is all you need, consists of

- 1 pair complete Head Lamps
- 2 Tungsten bulbs, 2-1/16" in diameter,
- 12 feet wire, all soldered to lamps,
- 1 Lighting Switch.

Instruction Sheet for Wiring.

The Lamps are made entirely of one piece of brass drawn from steel dies; have no soldered joints, easy to polish, and make a handsome lamp for the Ford cars. They fit the forks furnished on the Ford cars.

The Light which this outfit gives is vastly superior to either a generator or a gas tank.

The Bulbs have a Tungsten filament of the proper voltage and amperage, which will not interfere with the ignition, and have the Edison or Bayonet base, impossible to fall out and injure the silvered reflector like the screw base.

SPECIAL Outfit de Luxe, \$17.00

For those who want something "extra swell" or "classy" for the touring car, we can furnish, if desired, a 9" bullet shaped lamp which also fits the prop furnished on Ford cars.

The regular 8" lamp is, however, as large as required to catch all of the rays and throw all of them forward, and a larger lamp than this is merely for looks.

For Black Finishing add \$1.00 to price of either outfit.

WE PAY THE EXPRESS East of the Mississippi River or to the Mississippi on points beyond on any of our goods, when cash accompanies the order.

Write for CATALOGUE
SEVENTEEN

2817 CHESTER AVE.
THE K-W IGNITION CO.
CLEVELAND, OHIO, U.S.A.

\$1,000 CASH REWARD



SEND 5 CENTS IN STAMPS FOR PICTURE IN COLORS

THE BRICTSON MFG. CO. Have set aside \$1,000.00 in cash, which they offer to pay to any person or persons that can run more miles on a set of Pneumatic rubber tires WITHOUT Brictson Detachable Treads applied than WITH. This offer is open to the MOTORING PUBLIC including the MANUFACTURERS of RUBBER TIRES. Remember, this is a CASH "proposition"—none of your CHEAP "trophies," with an inflated valuation.

THIS IS A REAL BLUFF—WHO WILL CALL IT?

Now, Mr. "Free Adviser," You who are always so vitally interested in advising some fellow motorist against using Treads, whispering confidentially in his ear that he must not use them as they will ruin his tires, cause blowouts, heat the tubes and cause them to break—and all such foolish and untrue talk that has been "trumped" up by some one interested in keeping down the sale of tire protectors, something that is a REAL NECESSITY—that ALL MOTORISTS SHOULD HAVE—here is a chance to prove your statements. We stand ready and willing to prove ours. Now, if you KNOW so much about the "TIRE GAME" get busy at once, for according to YOUR advice, the \$1,000.00 will be "EASY MONEY."

CONDITIONS OF THE CONTEST

THE BRICTSON MFG. CO. Will use the same 66-H. P. six cylinder, seven passenger Pierce-Arrow car herein above illustrated, weighing 6,500 pounds, fully equipped with "BRICTSON" DETACHABLE TREADS, that won the tire test last July in the "TWIN CITY TO HELENA AUTO TOUR," and which was also OFFICIAL PRESS CAR AND STARTER in 1911 BIG GLIDDEN TOUR—New York City to Jacksonville, Florida.

THE CONTESTING CAR shall be one of same size and weight, using exactly the same size tires and tubes, and the tires and tubes on both cars must be exactly alike, so that one contestant will not have unfair advantage of the other.

The same schedule of TWENTY MILES PER HOUR shall be maintained—the same as in all A. A. A. tours for this class of cars. Each party shall have the privilege of furnishing an observer, who shall be a passenger in the contesting car. The run shall start from Brookings, S. D., and extend West to Los Angeles, California, and return.

TO LIVE DEALERS.

Do you realize that "BRICTSON" DETACHABLE TREADS are the best tire protectors on the market and that 1912 Models are even superior to the 1911 treads that made such a sensation in THE TWIN CITY TO HELENA TOUR, also the Big Glidden Tour (New York City to Jacksonville, Florida)?

Isn't it about time you were getting in line to reap your share of the profits from their sale in your territory? Some one will if you don't.

It is getting to a point now where Brictson Agencies are at a premium. Why not beat the other fellow to it and stick to it after you do get it, for the longer you have the BRICTSON AGENCY the greater asset it becomes. Send the coupon in the lower left hand corner of this page and we will do the rest.

THE BRICTSON MFG. CO.,
162 Brictson Building,
Brookings, South Dakota.
Without obligation on my part, send me your dealer's price list and full particulars.
Name.....
Address.....

THE BRICTSON MFG. CO.
BROOKINGS, S. D.,
U. S. A.

THE BRICTSON MFG. CO.,
162 Brictson Bldg.,
Brookings, South Dakota.
I am interested and would like to know more about "BRICTSON" DETACHABLE TREADS. Send me your booklet, "The Enemy of Tire Expense" proofs from Automobile owners, Prices, etc.
Size of Tire.....
Name.....
Address.....

What You Want & What You Get

You want to show a profit from your business — to make money.

You want to give your customers the best and quickest service possible.

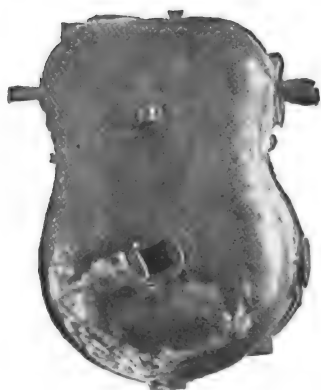
You want to build up your business for tomorrow.

A Prest-O-Welder outfit means sure profits to your business.

Prest-O-Welder saves the delays and cost in waiting for new parts.

Prest-O-Welder means more business for the man who uses it.

Prest-O-Welder

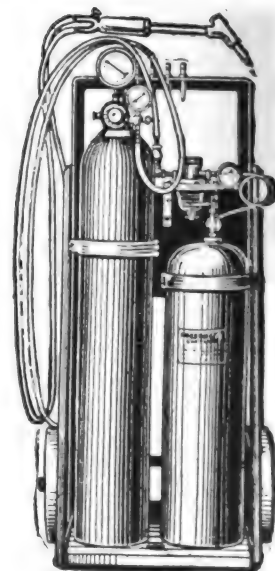


Showing completed welding job on automobile cylinder casting. Crooked cylinders are easily welded, and worn spark plug walls can be filled up, drilled and tapped.

is a new, compact, portable oxy-acetylene welding outfit—turns on and off like a gas jet—welds cast iron, steel, brass, bronze or aluminum.

In one shop, in one month, \$2,538.50 worth of broken parts were made good as new at a total cost of \$249.81.

We have a large, descriptive, illustrated book showing actual work done and telling of the construction and operation of this complete outfit. Just say, "Send me the Prest-O-Welder book to-day."



The Prest-O-Lite Company

Welding Department, 251 W. South Street

INDIANAPOLIS, INDIANA

Don't Pay for the OTHER FELLOW'S ABUSE. Just Pay for What YOU USE.

THE MOST WONDERFUL TIRE OFFER!

1912 FIRST
QUALITY

NORWALK TIRES

HIGH
GRADE

AT MONEY SAVING PRICES.

**Good Common Sense
Tire Talk**

Here is the tire that you and every other Automobile Owner have been looking and waiting for. The tire that is ~~made~~ good and makes good. It is so good that we have closed another contract for them. The way we are selling them and the splendid returns we hear of those previously sold leads us to confidently expect to double our order before long. ¶ During the past season several thousand of these NORWALK Shoes have been sold without a mileage guarantee, and in most cases duplicate orders have been received from the purchaser or his friends with the general comment that they gave more satisfaction than the ordinary guaranteed shoes. Do you realize that when you buy one of the regular high priced guaranteed shoes, that you are paying about 50 per cent. for the guarantee, and only getting 50 per cent. tire for your money? We offer you a NORWALK Shoe at a price based on the actual cost of making a first-class shoe with a reasonable profit added, so that you obtain 100 per cent. value when you buy a NORWALK Shoe. ¶ If you need a shoe, order one on our guarantee to refund your money if, on arrival and examination, it is not in every way satisfactory; or, without any deposit, you can order them sent C. O. D. with the privilege of examination. If it is in every way satisfactory, pay the express agent; if not, return it at our expense.

PRICES

Regular Clincher,
Q. D. Clincher and
Straight Side Dunlap Types

SIZE	New Reduced Standard List Price Shoes	Our New Reduced Prices on Norwalk Shoes	We Save You on Your Cost	New Reduced Standard List Prices on Tubes	Our New Reduced Prices on Norwalk Tubes	We Save You on Your Cost
28x3	\$12 60	\$ 9 50	32%	\$2 05	\$2 30	28%
30x3	13 50	10 50	28%	3 20	2 50	28%
32x3	14 40	11 40	26%	3 40	.....	.....
30x3½	19 85	14 30	38%	4 30	3 25	32%
31x3½	20 65	14 80	38%	4 40	3 35	31%
32x3½	21 20	15 30	38%	4 50	3 45	30%
34x3½	23 05	16 60	38%	4 80	3 75	28%
30x4	27 20	18 95	43%	5 30	4 25	25%
31x4	28 25	19 75	43%	5 45	4 40	24%
32x4	29 25	20 45	43%	5 65	4 50	23%
33x4	30 30	21 35	41%	5 80	4 65	24%
34x4	31 80	21 00	42%	5 85	4 75	25%
35x4	32 20	22 55	42%	6 05	4 90	21%
36x4	33 85	23 35	42%	6 25	5 00	25%
32x4½	37 30	26 15	42%	6 90	.....	.....
34x4½	39 65	27 85	42%	7 35	5 85	25%
35x4½	40 90	28 60	43%	7 50	5 95	25%
36x4½	42 05	29 40	43%	7 70	6 10	26%
35x5	50 30	36 40	38%	8 85	.....	.....
36x5	51 65	37 40	38%	9 05	7 25	24%
37x5	53 10	38 45	38%	9 35	7 50	24%

**ALL TYPES
ONE PRICE**

Mr. Auto Owner:—You can make money and friends by representing the NORWALK Tire in your section. We want one responsible man in your territory to push their sale, and we are ready to make him a good proposition. You may secure the agency if you write to-day to our New York office.

35% AUTO. SUPPLY CO.

97 Chambers St., New York.

1508 Michigan Ave., Chicago

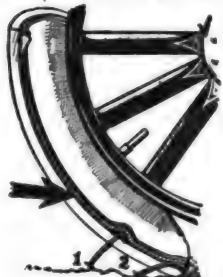


Please mention the Automobile Dealer and Repairer when writing to advertisers.

YOUR TIRES WILL NOT Puncture or Blowout

WHEN LINED WITH "BULLET PROOF" INNER TUBE PROTECTING WEBBING

Every owner finds tire trouble not only the most expensive item in the cost of upkeep but the greatest drawback to the pleasure of motoring as well.



1. Shows webbing taking nail.
2. Turning nail.

With the advent of "Bullet Proof" Waban Webbing this perpetual expense was overcome—there is no longer any excuse for tire trouble and expense.

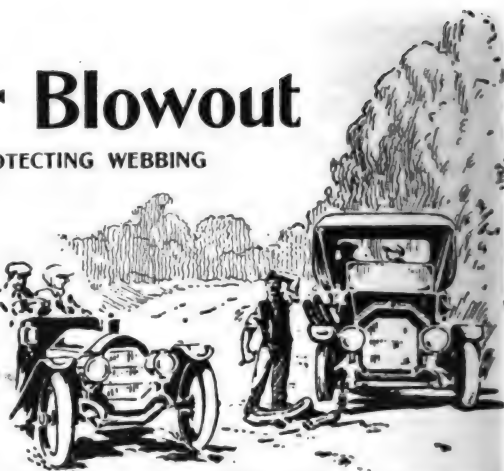
"Bullet Proof" is a heavy webbing, simply slipped between the inner tube and casing, and is the sanest and lowest priced article for lengthening the life of tires.

Easily inserted by anyone in a few minutes.

If you are not using "Bullet Proof" you're the loser.

WRITE TODAY
FOR BOOKLET J
AND PRICES

Of all sad words of tongue or pen, the saddest of these is "new tires again."



Waban Webbing Co., 207 Essex St., Boston, Mass.

TITANIC SPRINGS



Suitable to all makes and models of cars. They go on any car like any other spring. Guaranteed absolutely. If broken for any reason will replace at any time, and no questions asked.

No center hole—the curved center and retaining plate hold the spring positively.

No breakage—no hole to break in.

Has already been tested on 3000 cars

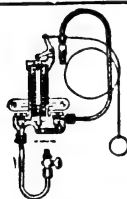
TUTHILL SPRING CO., 758 Park St., Chicago.

RUBBER PUTTY FOR TIRES

The Greatest Invention of Its Class. A True Money Saver and a Protection to Life and Limb.

Send at once for booklet giving further particulars and prices.

**THE TOLEDO AUTO DEVICES CO.
709 GARDNER BUILDING, TOLEDO, OHIO**



STOP

Cranking Your Auto.

**F. G. CRONE,
380 Genesee St.,
Buffalo, N. Y.**

**AUTO
TOPS
\$22.00**

Write for catalog and prices. We can save you money.

**BUOB & SCHEU,
Court and Broadway, Cincinnati, Ohio.**

New Process Storage Battery



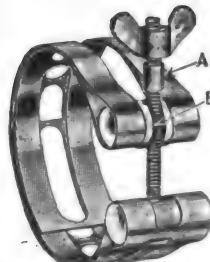
Best battery made.
Has longest life,
Greatest capacity.

PRICES

6 volt 30 ampere battery	\$7.48
" 40 " "	8.15
" 60 " "	9.75
" 80 " "	13.65
" 120 " "	19.50
" 150 " "	22.75

**Schug Electric Mfg. Co.
Dept. B, Detroit, Mich., U. S. A.**

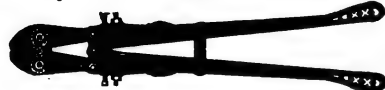
THE CATELAIN HOSE CLAMP



Nothing has ever been created in this line comparable with it. This clamp can be attached or detached in a few seconds. It cannot slip, loosen, or cut the hose, and its strength, owing to its construction of band metal, and the way the ends are overlapped, is simply a perfect clamp, and the price is very low. Let us tell you more about it, or if you are an automobile manufacturer or dealer, let us send you one for inspection.

A. C. Catelain, 1446-48 Indiana Ave., Chicago, Ill.

PORTER'S BOLT CLIPPERS "Easy" "New Easy" Allen-Randall



To cut 5-16, 3-8, 1-2, 5-8, 3-4 inch.
H. K. PORTER, EVERETT, MASS.

FIBRE

Sheets, Rods, Tubes and Special Shapes for Automobile Work

H. M. GRANT

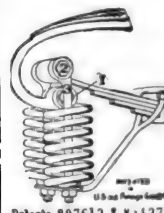
6 Murray Street, New York



SILVER KING

Has an adjustable handle and a universal joint which will allow it to be worked where no other wrench can be.

**C-M-B WRENCH COMPANY
908 1/2 E. Genesee St., Syracuse, N. Y.**



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St. Louis Supplementary Spring

For Comfort, Economy, Safety, Speed. Tell us the name of your car, model, year and approximate weight. We will advise you the proper size and style to use and what they will cost you. Write today for Catalog. Distributors of the famous Hoffer's Speedometer.

FRANK W. KEEGAN, 1779 Broadway, N. Y. Agent, Supplementary Spring Co., St. Louis.

TIRE CLIPS RUST-PROOF RIM COMPOUND

DRAPER MFG. CO., Richmond, Ind.

SOMETHING NEW!!

How to save gasoline
How to avoid ignition troubles.
How to make two simultaneous sparks.
How to increase your power 17 1/2 per cent.
How to have two independent systems on one plug

Write for Free Information.

**Superior Motor Specialty Co.
44 N. 4th St., Philadelphia, Pa.**



TAKES THE ROAD

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Try
wires
(Cable)
250 W.



The Sign of Good Cars

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Maxwell, Brush, Courier,
Sampson Trucks

**UNITED STATES MOTOR COMPANY
3 West 61st St., New York City**

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**\$1.00
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The Atwater Kent Ignition System

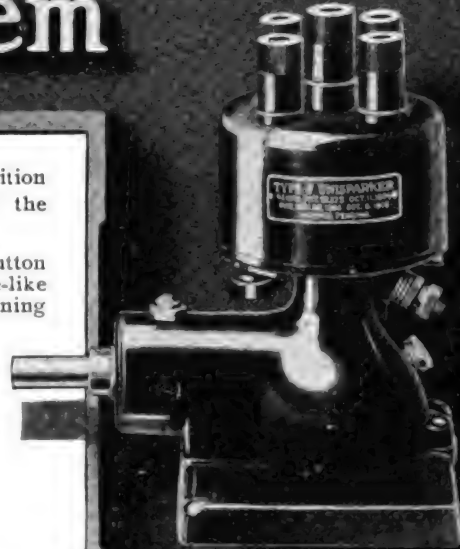
ANY CAR equipped with a self-starter requires an ignition system capable of producing a hot starting spark with the engine at a standstill.

Instead of a thin stream of weak sparks, the starting button of the Atwater Kent System produces a single heavy flame-like spark from three to five times hotter than the normal running spark. It will ignite any mixture that will burn.

This is but one of many excellent features of an ignition system that combines all of the advantages of both magneto and battery ignition—a simple device with but three moving parts, one contact, one adjustment—one non-vibrating coil—a system ideal in its efficiency, simplicity and reliability.

Write today for illustrated booklet "G"
full of interesting ignition information

Atwater Kent Mfg. Works,
Sixth and Market Streets, Philadelphia, Pa.



DON'T BE FOOLED

ANY LONGER
INSIST
UPON
HAVING
A

"VULCUM"
TIRE REPAIR OUTFIT
THE ONE
SCIENTIFIC
PROCESS
"VULCUM"
VULCANIZES
TUBES OR CASES

Price, Complete Outfit, \$2.00; Enough for 50 Guaranteed Repairs.

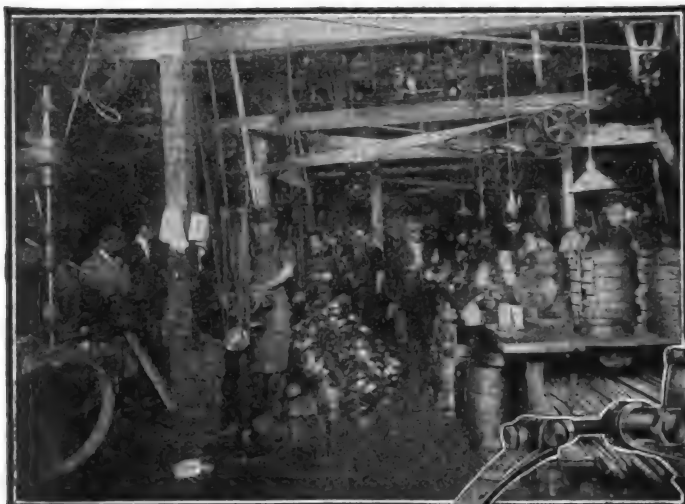
For Best attention address

MONEY BACK GUARANTEE

VULCUM MANAGER, Richardson Tire Co., Hartford, Conn.

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The Largest Brake Business In Our History



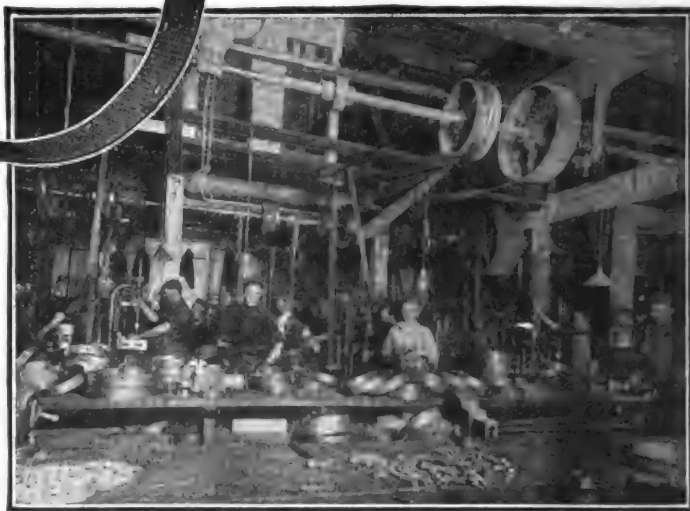
DUPLEX EXTERNAL BRAKES

The remarkable demand for DUPLEX and RAYMOND brakes has resulted in a phenomenal increase in our business. At present we are operating our entire plant at maximum capacity. We have also rented additional space and added new machinery in an effort to keep ahead of our orders. Every effort is being made to supply the demand for our products.

"There's a Reason"

Manufacturers, motorists and dealers have come to regard us as the foremost brake builders in the industry. Our designs have always led the field. Our workmanship and material is recognized as the best.

We not only supply DUPLEX AND RAYMOND brakes complete, but we also manufacture large quantities of brake bands, lined, in accordance with special specifications. We recently received an order for 20,000 lined bands. Demonstrating the remarkable demand for our products. We are pre-eminent brake specialists. Our customers include the better manufacturers throughout the industry. Dealers and owners always look to us when having brake troubles.



Our long years of experience, our service, our expert engineers, and above all our excellent facilities, have proven our right to be known as

The Leading Brake Builders of America

Write for descriptive literature. Send your specifications—whether for one or one thousand brakes. We'll be glad to serve you. Also remember that we make RAYBESTOS Brake Lining and GYREX—the Mixer.

THE ROYAL EQUIPMENT COMPANY

450 Housatonic Avenue

Bridgeport, Conn.

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What is "Good" Motor Car Service?

Whether or not your car gives good service depends entirely on what your standard of good service is.

If you are contented with using your car only about six or eight months of the year—and only over the best roads you can find—then probably you would be satisfied with most any car on the market today.

But if you want a car that is always ready for you—in winter and summer—a car that you can drive anywhere you may have a desire to go—then you will have to be mighty careful in the car you choose.

Getting right down to brass tacks—a car must stand three things to be capable of giving good service. These are sand, mud, and hills. If all roads were paved with asphalt any car would answer the purpose—but until that time comes there will only be a very few cars that can possibly give really "good" service.

First, your car must have the minimum waste power. The more complicated the construction the more waste power, always. Your car must be simple and strongly made to stand the strain that is sure to come. And it must be easily operated so that there will be no possibility of causing trouble through some mistake on the driver's part.

Of course, you can readily see that a car which has these features will be more efficient on good roads.

The Cartercar has practically no waste power. This is because of the patented Friction Transmission, which has only two unit parts. This is also the simplest transmission possible. There is absolutely nothing about it to cause trouble.

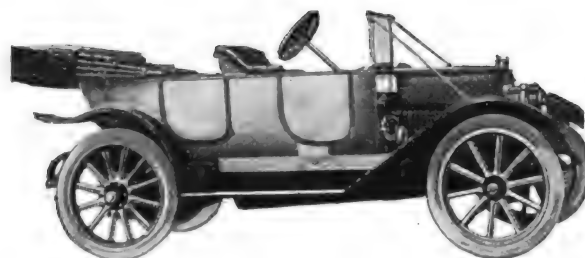
This transmission affords you any number of speeds. At the lowest speed the ratio is so great that the Cartercar will easily climb a 50% grade. This same power will take the car through very bad sand and mud.

And it is remarkably easy to operate, too. You have this unlimited number of speeds with a one lever control. There are also three independent systems of brakes, making the Cartercar safe and delightful for ladies to drive.

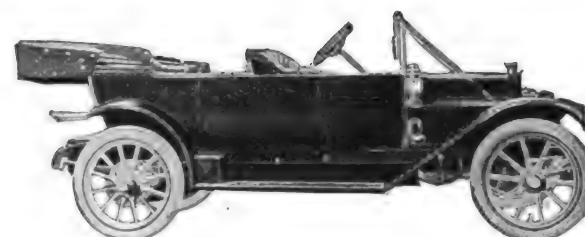
The Cartercar is adapted for use on both crowded city streets and country roads—giving perfect service wherever you wish to drive.

Five splendid models, ranging in price from \$1200 to \$2100. This includes complete equipment, Self Starter, top, top cover, windshield, speedometer, gas tank, five lamps, robe rail, trunk rack, tonneau mat, demountable rims, tools, tire repair outfit, etc.

If you want a car for service—real service—then you will be interested in the Cartercar, the car without gears.



A big classy Roadster, equipped



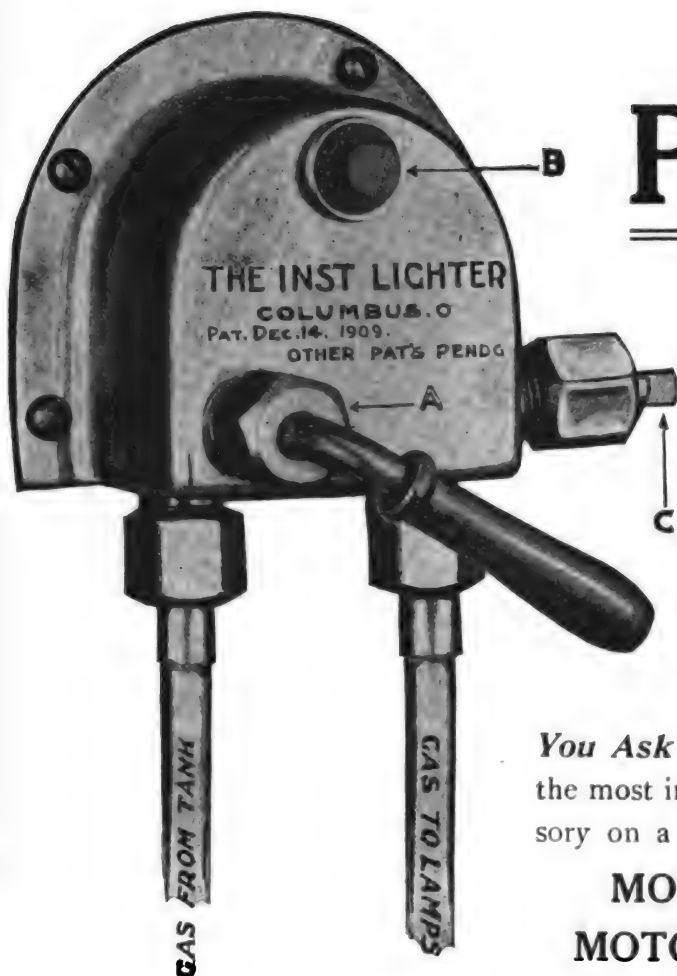
Seven passenger, equipped, \$2100

Write us for catalog and any information you wish.

We'll tell you where you can secure a demonstration.

Cartercar Company,
PONTIAC, MICHIGAN

BRANCHES: New York, Detroit, Chicago and Kansas City.



THE PACKARD

MOTOR CAR CO.

INSTALLS AN

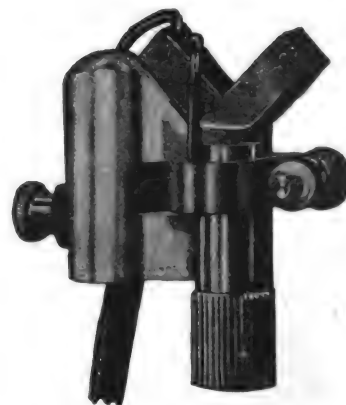
INST LIGHTER

C for lighting the Gas Headlights on *Every Packard Car that leaves their Factory.*

Other makers are doing the same thing *if*

You Ask For It. It is the most important accessory on a

**MODERN
MOTOR CAR.**



The Inst Lighter is the only successful lighter. It lights, controls and adjusts the gas Headlights from the driver's seat while the car *is running or standing still.*

Always easy to reach while driving. Easily and quickly installed on *any car*, on the dash *either above or below the hood line*, without drilling holes or sawing sections out of the dash.

Goes on the Heel Board under driver's seat if desired.

Operates in the dark by the sense of touch. Open "A" and push "B," (gas adjustment constant at "C").

Price, including COIL, PIPE, WIRE, and everything necessary for attaching an INST LIGHTER to any car,

\$15.00

**1913 MODELS
NOW OUT**

NEW WATERPROOF COIL
GOES UNDER THE HOOD.

MAKE YOUR CAR UP TO DATE

ORDER IT ON YOUR NEW CAR FROM THE FACTORY

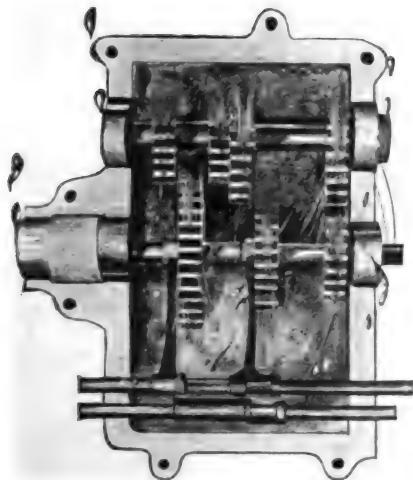
Your dealer has it. Take no substitutes.

THE INST LIGHTER CO., 56 E. Main Street, Columbus, Ohio.

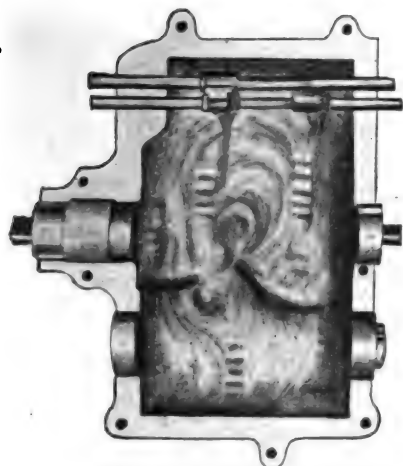
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What Silence Signifies

The best evidence of efficiency in a car is *silence*, and nothing contributes to silent operation like perfectly lubricated transmission gears.



Mixture of oil and grease.



NON-FLUID OIL.

Noise in all machinery is evidence of friction. Grinding and clatter of gears means that power intended for driving the car is exhausting itself in destructive friction. This noise is significant of wear in the teeth of the gears, just as the rasp of the file is a sign that it is cutting metal.

If you were to put "K-No. 00 Special" Non-Fluid Oil on a piece of brass, no file would cut it—the file would glide off silently and harmlessly. If you were to do the same with a stiff fibrous grease, a few strokes of the file would bare the metal and cutting would begin.

This is the identical process which goes on in the operation of gears,—in your transmission. Furthermore, stiff grease so clogs the teeth, if it happens to remain there, that as high as ten per cent. of your engine power is lost in overcoming this gear resistance. An English engineer recently demonstrated this.

The secret of silent gears is a yielding cushion of lubricant in the teeth. Oil—good boiled oil—would answer if it could be made to adhere to the teeth but it drains away before the point of meshing is reached. In addition, oil is hard to confine in the gear case,—it leaks out.

"K-No. 00 Special"



is a very soft, yielding, adhesive lubricant. It offers no resistance to the motion of the gears and clings to the teeth at maximum speed. All you motorists who mix oil and grease to get an ideal consistency in your gear lubricant will find "K-No. 00 Special" Non-Fluid Oil exactly suited to your purpose. It is permanent in body—heat or cold will not change it.

Ask your dealer for a ten pound can—be sure to get "K-No. 00 Special" grade Non-Fluid Oil. Clean out your gear case and test our claims that for silent, frictionless operation of your gears, for ease and quietness in changing speed, for lasting qualities, cleanliness and all around economy, nothing approaches it.

If you could see a sample you would agree that "K-No. 00 Special" Non-Fluid Oil is the lubricant you have sought.

Write us for a sample for inspection. For convenience, use the attached coupon. Paste it on a postal and mail to-day.



Originators and Sole Manufacturers
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Pacific Coast Distributors
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Please send me sample of
 K-No. 00 Special NON-FLUID OIL.

Name

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Dealer

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A. D. R.—12.

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7000 MILES

Without a Blow-out is an ordinary average when using

INTERLOCK INNER TIRES

Interlocks will Save You Money, Save You Annoying Delays on the Road, Save You from Blow-outs and Punctures, and make Motoring a Real Pleasure.

The Photo below is from one of several tires shown at the automobile shows and in jobbers' windows. Holding full pressure under this extreme test is practical proof that the Interlock is bound to prevent blow-outs and give extremely long mileage in any reasonably sound tire.

INTERLOCKS ARE NOT AN EXTRA EXPENSE

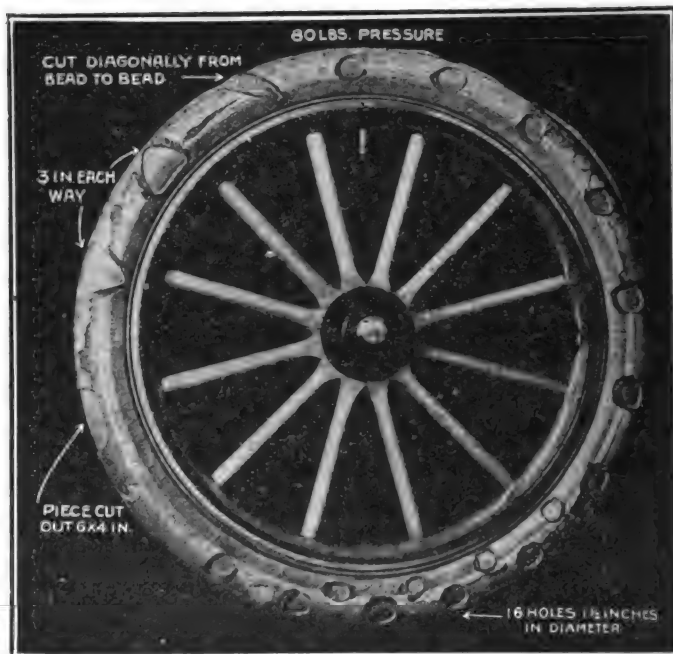
in fact the cost of repairing blow-outs alone would buy them, to say nothing of losing twice their cost in "blow-out shortened" mileage, and the real value of tire comfort.

You want to get rid of tire trouble and you know that if a tire has a liberal excess of fabric strength it simply cannot blow out till worn clear through by extreme long mileage.



Interlocks Provide This Extra Strength In Practical Form.

Note—Do not confuse Interlocks with ordinary open edge inner shoes or liners. Interlocks are altogether different, and better.



Description: Interlocks look and are like a tire, being full round, endless and made to fit correctly. They are extra good quality throughout, smooth finish inside and out and so designed that they self-lock to the rim, positively preventing any heat or friction. Easily placed in any tire.

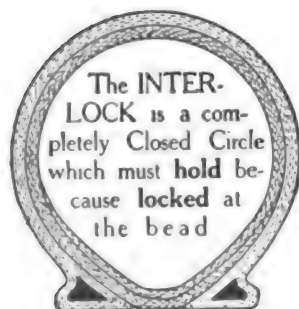
Our Unusual 30 Day Free Trial Offer Proves Merit

To convince the most skeptical that Interlocks are a good investment we will equip your car with a full set, and if within 30 days you are not satisfied that Interlocks prevent blow-outs and punctures, and increase your mileage, you can return them and they will cost you nothing. (This offer being limited to introducing Interlocks where not well known, kindly fill out the corner coupon and mail to us promptly.)

Special Agents are doing good business selling Interlocks to owners, who only need to see the article to recognize its practical benefits. Now is the time to get busy. Write us promptly.

Dealers, Jobbers and Supply Houses—have your salesmen push the sale of Interlocks. They make good and repeat orders follow rapidly.

DOUBLE FABRIC TIRE CO.
18 W. 9th St., Auburn, Ind.



Gentlemen: Please mail me your catalog and Special 30 Day Trial Offer without any obligation whatever on my part.

Size of Tires

Name

Street

Address

My Supply Dealer is

Address

That Tire Question

Would soon cease to be so annoying, once you make yourself acquainted with the **Triple Tread** method of eliminating your punctures, preventing your car from skidding, and doubling your tire mileage.



"BEFORE"

The strength and resilience of a tire is in its heavy fabric carcass. Rubber treads are only to furnish a wearing surface to protect this carcass, and to keep out its greatest enemy—water.

Chrome leather, reinforced by steel studs, is the only thing tough enough, water proof and pliable enough to make a better and more economical tire tread than rubber. Chrome leather is ten times tougher than rubber, and water proof.

Three plies of this leather, brought down over the bead of the case so as to prevent rim cutting, and to protect against rut wear—three to six rows of hardened steel studs to give traction and prevent skidding—all this securely **vulcanized** to your casing (old or new) to keep out water and dirt—goes to make up the highest grade of tire efficiency.

The secret of Triple Tread Success lies in the fact that the Triple Tread affords perfect protection to the fabric carcass and positively keeps out all water, which causes rotting. Rubber treads cannot do this—detachable rubber or leather treads cannot do it—inside linings cannot do it. **Nothing but chrome leather, vulcanized to your tires in the Triple Tread way, can do it.**

PUNCTURE PROOF SKID PROOF GUARANTEED

Let us Triple Tread just one of your tires now for a trial. The best time to act is while your car is laid up for the winter. Don't wait till you are ready to take the car out in the Spring.

**Write our nearest factory for full particulars and prices.
EVERY TRIPLE TREAD GUARANTEED FOR 3500 MILES.**

Name

Address

Make of car..... Size of tires.....



"AFTER"

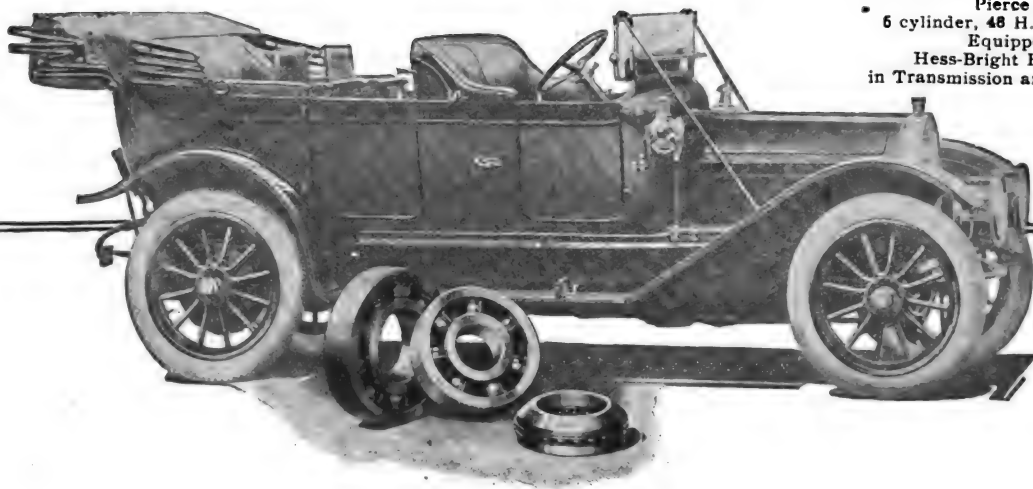
Triple Tread Manufacturing Co.

CHICAGO
1542 Michigan Avenue

SAN FRANCISCO
542 Van Ness Avenue

WINNIPEG
52 Gertle Street

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Pierce Arrow
6 cylinder, 48 H. P. Touring Car,
Equipped with
Hess-Bright Ball Bearings
in Transmission and on Differential.

The Cars Worth Having

Some automobiles are built and bought for today, and the morrow takes care of itself. Though their first cost is often low, they are in the end the expensive cars.

Other automobiles are built for tomorrow and next year and ten years hence. Seasons come and go, paint and varnish are many times renewed, the ignition system or carbureter may be changed and rechanged. But still their wheels roll off the unflagging miles, and ten or twenty thousand more seem to make little difference to these tireless cars. Valves and bushings are replaced, cylinders are reground and new pistons fitted; gears are renewed, and once in a long, long time new bearings are supplied.

The owners of these cars know well the economy of having gears and bearings that do their work long and well and silently. They know what it means to be able to O. K. the bearings for another year or two when the car is "shopped" for overhauling. Most of them use

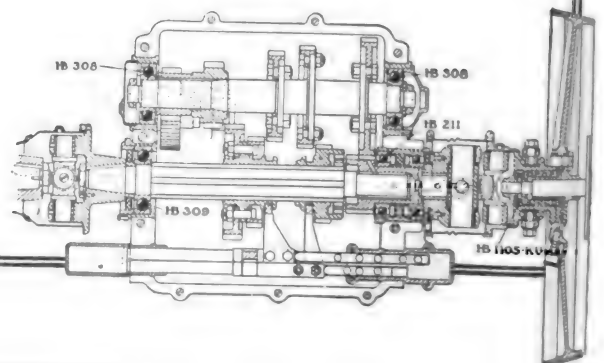
HESS-BRIGHT BALL BEARINGS

Built for Endurance

Our booklet, "Ball Bearings that Endure," tells why Hess-Brights last longest. Write your name and address on the margin of this advertisement and mail to us. A copy of the booklet will reach you by return mail.

**THE
HESS-BRIGHT
MANUFACTURING COMPANY**

**2119 Fairmount Ave.
Philadelphia, Pa.**



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LOOK FOR THE NAME STAPLEY TIRE PUMP

Made by Bridgeport Brass Company.

Inflates Tires In A Jiffy

This powerful compound pump does the work of three ordinary pumps. It is strong, sturdy and will not leak.

Absolutely non-leakable joints. Seamless brass tube cylinder. Heavy cast base. Automatic valve opener. The name "STAPLEY" is stamped in the top for your protection. When you ask for a "STAPLEY"—see that the dealer gives it to you. Better get one to-day.

If your dealer doesn't carry it, we will send the STAPLEY, prepaid in U. S., on receipt of price.

Without Gauge, \$4.00
With Gauge, \$6.00

BRIDGEPORT BRASS COMPANY

P. O. Station D

BRIDGEPORT, CONN

ALLEN TIRE CASE

PRICES
\$ 3.00 UP

**ALLEN
TYROMETER**
TIRE PRESSURE GAUGE
HIGHEST IN EFFICIENCY
ABSOLUTELY ACCURATE

ALLEN TIRE CASE
PATENTED

ALLEN TIRE LOCK

THE ALLEN AUTO SPECIALTY CO.
MANUFACTURERS
1926 Broadway, New York
1436 Michigan Ave., Chicago
IRVIN SILVERBERG & CO.
541 Van Ness Avenue, San Francisco

\$1.00

HOW TO RUN AND INSTALL GASOLINE ENGINES



THIS little book was written especially for beginners. Either the man who uses an engine for pleasure or profit, but who has not time to study a technical book.

It gives full details in connection with running gasoline engines, stated in simple language that anybody can comprehend. It contains numerous illustrations.

A copy will be sent you on receipt of the price, 25 cents, in postage stamps.

Motor Vehicle Publishing Co.,

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Direct Advertising

The Automobile Advertising Company will address, fold and mail your printed matter or letter to every automobile owner in the United States at a moderate cost and save you the trouble and expense of keeping up lists.

If you want to address certain sections of the country only, we can do that for you.

If you want to address owners of new cars as soon as they register, we can do that for you.

If you want to reach the owners of certain makes of cars, we can do that for you.

If you want lists of owners in any State or for any make of car, we can furnish them.

Our lists are all on cards alphabetically arranged, and we keep them up to date by the addition of new names weekly. We also get all returns that our customers receive from the Post Office and those names are taken from our files immediately. **YOU DON'T BUY DEAD NAMES.**

We have the names of 493,000 actual automobile owners in our files. They are your public. But only by direct advertising can you reach your man when he is free to listen to your appeal undisturbed and undistracted by a hundred screaming competitors. **AND OUR WAY COSTS LESS.**

If you will write us we will give you the benefit of an experience that is saving thousands of dollars for some of the biggest advertisers in the country.

Automobile Advertising Company
385 Fourth Avenue
New York City

Does your gas line leak?
Don't know, do you?
Test it and you will know.
50% of gas lines leak and lose 25% of gas.
Stop losing yours.

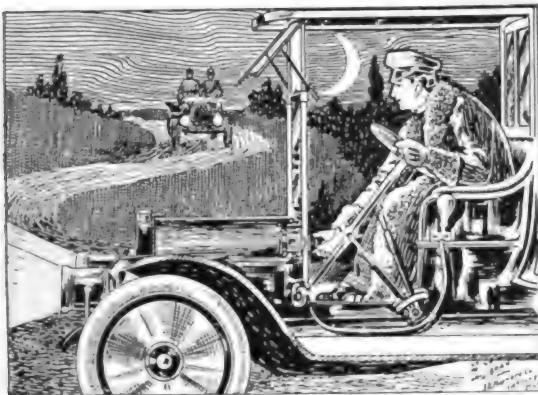
The AA Gas Leak Detector

will show the smallest leak in a minute. Simply pull tubes off lamps and insert detector tips. Turn on gas and inflate bulb 2 in. or 4 in., then turn off gas. If bulb goes down there is a leak, which is readily located by applying soapsuds to joints.

By Mail, 50 Cents.

The Auto Appliance Mfg. Co., Akron, Ohio.

Do Away With the Match Nuisance



Use a HAIGHT LIGHTER

Your lamps can be lighted, turned down or out, while driving. Regular equipment on the Oldsmobile.

Write for Booklet.

Made by
HAIGHT AUTO
LIGHTER CO.
Lansing, Mich.

Listen! Everywhere You Hear the Bugle Note of

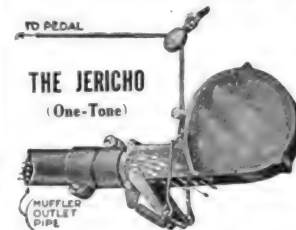
Jericho ONE TONE Horn Jubilee CHIME TONE Horn

The Signal of a Gentleman—Warns Without Offence

JERICO Saves 50% of installation cost. Saves 100% of maintenance cost, because there isn't any. It **Saves Money** saves accident costs because it prevents them.

JERICO Pleases the public. Enables you to signal with your foot, leaving your hands free. Saves you **Saves Trouble** controversy, for it warns unmistakably and melodiously.

Any motor car agency, accessory dealer or garage will sell and put on a Jericho or Jubilee—and the entire cost will be less than \$10.



If your dealer cannot supply you, write for our Free BOOKLET D about Jericho and Jubilee and other auto accessories.

The Randall-Faichney Co.
BOSTON, MASS.



"EXO"

THE LOW PRICED HORN WITH
THE HIGH PRICED VOICE

Note the Price:

ALL SIZES FOR CARS OVER 30 HORSE-POWER, \$7 00

ALL SIZES FOR CARS 30 HORSE-POWER AND UNDER, \$5.00

Attach it yourself in 15 minutes. Operates from the Exhaust.

Satisfaction Guaranteed or Money Back.

Ask your dealer, or order direct.

Give make, year and model of car.

TROY AUTO SPECIALTY CO., Troy, N. Y.



Pat.
applied
for.

The Vulcan Puller

A tool for the garage and repair shop. Used for removing automobile gears, wheels and pulleys. Also for straightening automobile axles and frames. A card will bring you full description.

Winchester Machine Works
Winchester, Ind.

More Power and Speed with Less Gasoline

The M. & M. ECONOMIZER

Is Made for Getting More Power and Speed with Less Gasoline.

THE M. & M. IS FOR

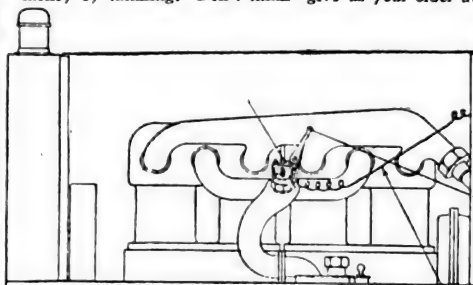
Cooling your Engine
Lubricating the Cylinders
Saving about 40% to 50% of Gasoline
Saving the Brakes
Prolonging the Life of the Batteries
Saving your CLUTCH and Gears
Giving you Control over your Car
Safety Valve in case of back-firing
Saving the Electric current
Making hill climbing easy
Making crowded Streets and rough roads easy



The M. & M. is made with two valves, one for speeding and power with less gasoline, and one valve for coasting.

The M. & M. Economizer goes on the intake pipe and operated by foot pedal, uses no gasoline whatever going down grades. What the coaster brake is to a bicycle the M. & M. is to the automobile.

No automobile is complete without it. By the use of the M. & M. Economizer accidents can be avoided, and your car under absolute control at all times. Simple to attach. Any garage or machine shop can install it on short notice. Act at once. Remember, While you are thinking about giving us your order for one of these M. & M. Economizers you are losing money by thinking. Don't think—give us your order at once.



Patented in
United States
and Europe

Price
Complete
\$3.50
Agent's
Wanted

Money refund-
ed if the M. &
M. will not do
all we claim.

The above cut shows M and M all ready attached

Moller Brothers Controller & Economizer Co.
700 Betz Building
Philadelphia, Pa.

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GET WISE

READ THIS Unsolicited Letter we found in this paper.

From L. E. Norfleet, M.D., North Carolina.—I have run a Model T Ford since May, 1900, and it runs as good as new today. Its average cost per month has been about \$12.50, one-half what a horse and buggy cost me to keep. My machine is just as the Ford Company sent it to me, never even having had batteries placed on it, and what replacements I have needed have always been charged to me at very reasonable figures. I find the Monarch the best plug for my use, and it is the very easiest plug I know of to clean.

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75 Cents Each
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For Buick and Maxwell Cars.

1 Cylinder	\$2.75
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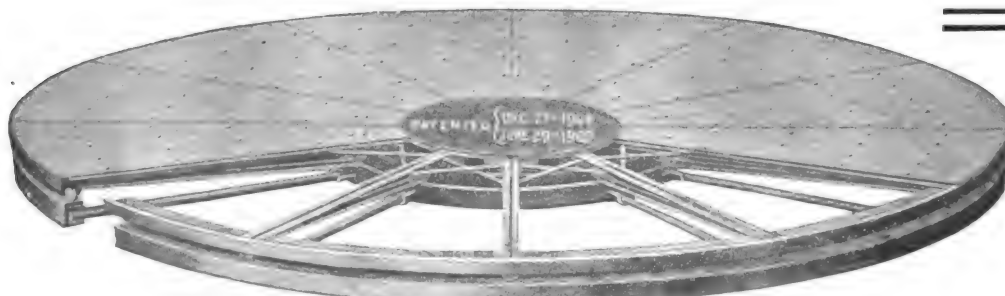
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Every tire is guaranteed brand new, perfect in every respect, and are not more than six months old. Some of these have the names of the makers on and others are buffed.

We thoroughly examine and test every tire and tube under heavy pressure to detect any weakness before shipping.

These are not the kind usually advertised. Nothing but the best stock is quoted in this ad.

Casings to fit Clinchers, Quick Detachable or Dunlop Straight Side Tires.

Size	Casing	Tube	Size	Casing	Tube
28x8	\$9.50	\$2.50	35x4	\$22.00	\$5.25
30x8	10.75	2.75	36x4	19.50	5.40
32x8	10.50	3.00	37x4	22.50	5.75
28x8½	12.00	3.00	32x4½	20.00	5.50
29x8½	14.50	3.15	38x4½	23.00	5.60
30x8½	14.50	3.75	34x4½	28.50	5.75
31x8½	15.00	3.75	35x4½	24.50	6.00
32x8½	15.00	3.90	36x4½	25.00	6.10
34x8½	15.75	4.15	37x4½	25.00	6.20
36x8½	15.00	4.25	34x5	20.00	6.00
30x4	16.50	4.60	35x5	25.50	6.25
31x4	17.00	4.75	36x5	26.00	6.50
32x4	17.50	4.90	37x5	28.00	6.75
33x4	19.00	5.00	37x5½	30.00	7.00
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Take advantage of these prices and free offer, as we cannot guarantee how long these prices will stand good.

We guarantee these tires and tubes to be strictly 1911 and 1912 goods.

We are one of the oldest and largest tire mail order houses in the United States, and you do not have to hesitate to send us an order with cash accompanied, as we can refer you to any Commercial Agency or Bank in New York, as to our references.

We agree to refund your money if goods are found unsatisfactory upon receipt.

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Prevent blow-outs, punctures, and greatly increase mileage. These tire protectors are made from 3 to 6 ply of Egyptian fabric, with a self-seal flap reinforcing the rim and sides, always the weakest parts. Tube pinches are eliminated by the use of these protectors.

Order a complete set of them and save 100% on your tire expense.

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30x8½	5.25	3.35	34x4½	7.50	5.10
32x8½	5.50	3.55	35x4½	7.60	5.25
34x8½	5.75	3.95	36x4½	8.00	5.50
30x4	6.20	3.75	34x5	8.10	5.60
31x4	6.25	4.00	35x5	8.25	5.75
32x4	6.40	4.20	36x5	8.50	6.00
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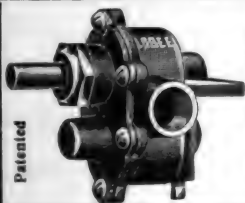
in your garage will make more friends than the boss himself.
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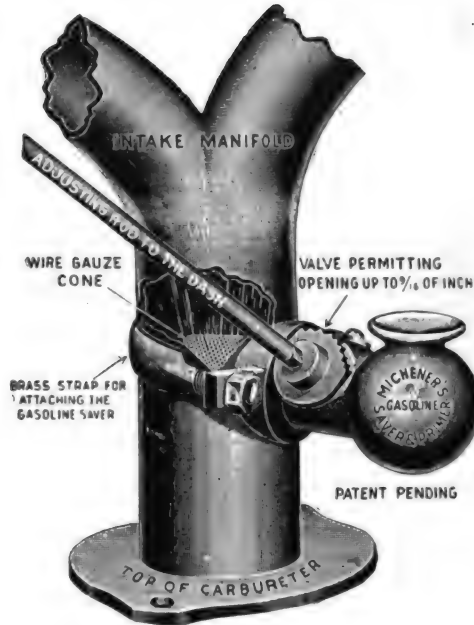
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This little device will positively save you at least 25 per cent of the gasoline you now use. It will give you more power and speed, make your engine run cooler and more smoothly and prevent the formation of carbon resulting from over-rich mixture. Proper carburetion is the most necessary requirement of satisfactory motor operation. This will insure perfect carburetion under all conditions.

Michener's Gasoline Saver and Primer admits auxiliary air above the carburetor, the amount being controlled by an adjusting rod on the dash. The spray of fine gasoline drops drawn from the carburetor is broken up by the wire gauze cone and thoroughly mixed with the incoming air. When the mixture reaches the cylinders it is a true vapor or gas, not merely a physical mixture of gasoline and air.

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Use your motor as a brake when coasting down hill. Close the throttle and open the air valve. It feeds the motor pure cold air, saving gasoline, cooling the cylinders and saving the brakes.

Can be installed in a few minutes. Made of solid brass, polished. When ordering state which side of motor the carburetor is on. **PRICE, COMPLETE, \$5.00 including rod and dash connections.**

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Guaranteed to remove every bit of carbon from the cylinder top, sides and piston head in two minutes. Every motor has more or less carbon, regardless of oil or gasoline used, and should be cleaned regularly. Increases power, prevents knocking and excessive wear and makes motor run cooler.

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Pat. April 2, 1912.

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With this kettle you can cure a retread as easily as a sectional repair. **There is not a single bolt to tighten.**

Give your customers quick service by curing retreads as fast as they are built up.

You can make money repairing tires either as part of a garage and general repair business or as a separate venture. Requires very little capital to equip a shop completely with the best tire repairing outfit in the world. The equipment can be paid for and a good profit made by the first season's work. Every motorist must have tires repaired—every motorist in your vicinity is a possible customer for tire repairing.

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Localized heat is the secret of the Akron-Williams. Three separate steam chambers in each of our sections, our exclusive patented feature, limit the curing process to the repaired part.

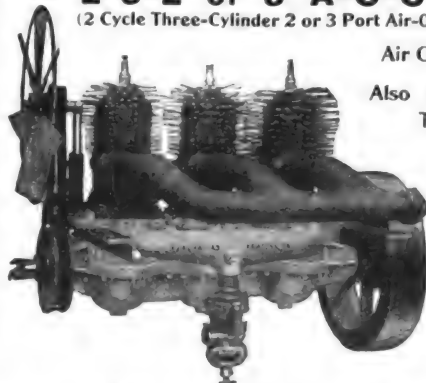
Proof that the Akron-Williams is the best is the fact that the big tire manufacturers use it—Firestone, Goodyear, Diamond, Republic, Pennsylvania, Revere, Hartford, Consolidated, Empire, Manhattan, Shawmut and many other tire manufacturers are among our customers. They know by experience what is most practical. We can equip a tire repairing plant of any desired capacity. Don't delay getting into this profitable business.

Get into correspondence with us to-day.

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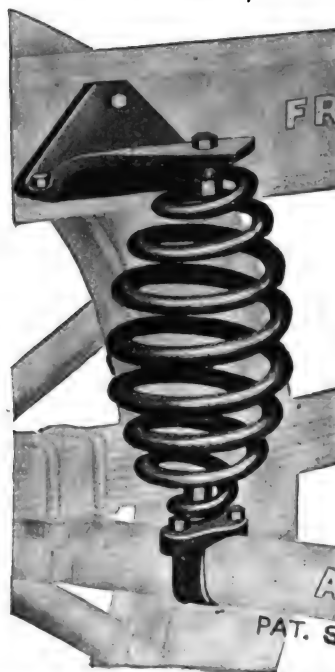
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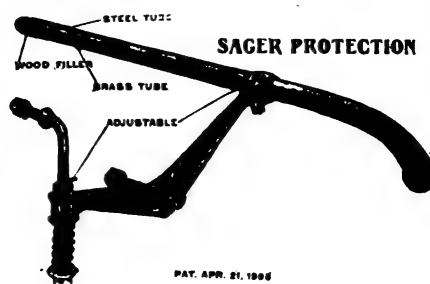
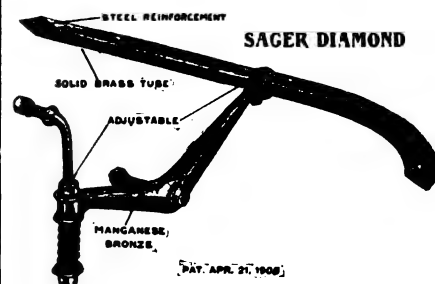
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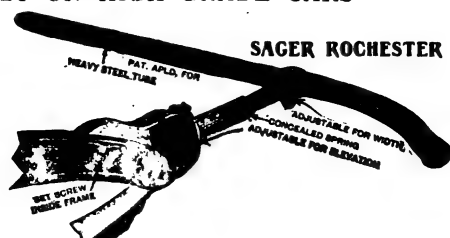
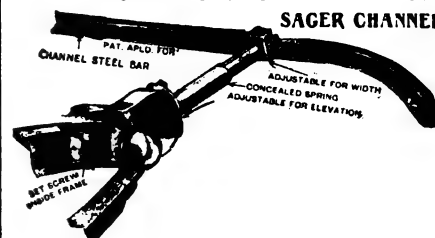
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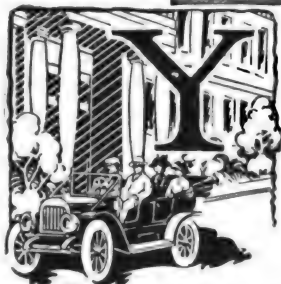
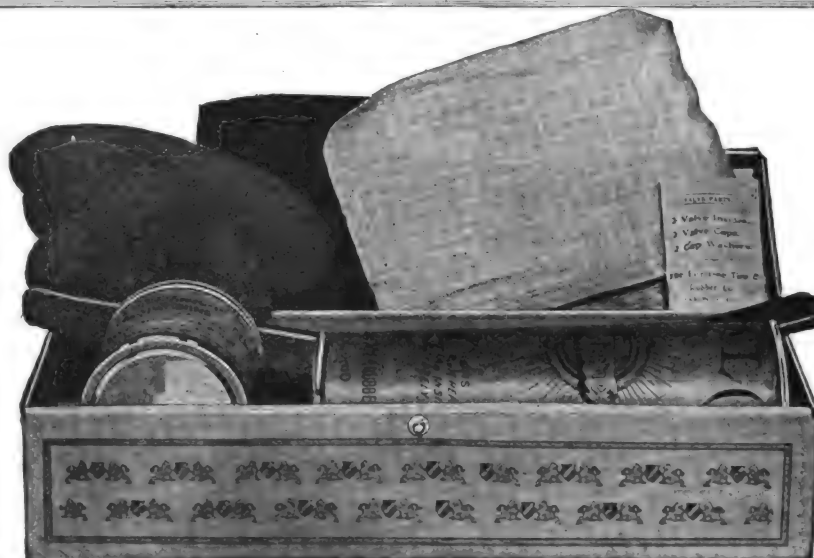
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The same time tried, and expertly inspected and tested materials which go into Firestone Tires; the same tire making know-how and minute care, are employed in the manufacture of

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Accessories

and repairs. These accessories must fit to a standard of efficiency as high as for the tires themselves.

Cementless Patches—Highest quality, for quick, handy road side repairs.

"Cure-Cut"—To fill in tread cuts and punctures,—keeps moisture from entering, thereby preventing serious tire trouble.

Blow-out Boots—Extra long, made from high quality fabrics, stretched with double flaps for locking around each bead.

Tire Tale—Assuring easy placing of inner tubes.

Pure Gum and Red Wrapped Tube Patches—Full of stretch, easily and securely applied with our 1041 cement. The cement is furnished either in tubes or 1-4 pt. cans up to one gallon.

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Also—Repair Materials in Packages—Emergency Patches—Lace-on-Boots—Pumps—Air Pressure Gauges—Valve and Valve Parts—Complete Repair Kits.

Users of portable vulcanizers will appreciate the fact that Firestone repair materials are furnished in one and two lb. air tight packages.

Write for our latest book "Pneumatic Repairs, How to Make Them." Get Samples and Business Making Proposition.

The Firestone Tire & Rubber Co., Akron, O.
"America's Largest Exclusive Tire and Rim Makers"

Branches and Agencies in all Principal Cities

A Great Tire For Your Customers Who Own Utility Cars

Don't be content with selling Motz Cushion Tires merely to owners of pleasure cars.

Get in touch with owners of utility cars, too. Every owner of a business Runabout, Town Car, Taxicab, Ambulance or Light Commercial Car will use Motz Cushion Tires the moment he realizes their many advantages.

The Motz Cushion Tire

Show these owners of utility cars how amazingly easy-riding Motz Cushion Tires are.

Emphasize that these tires never cause trouble; that they end puncture and blow-out troubles forever.

Call attention to the fact that Motz Cushion Tires wipe out tire-repair bills; that they require no extra tires.

And the guarantee. Don't forget that each set of Motz Cushion Tires is guaranteed for 10,000 miles—two years.

Fit any standard clincher, universal quick detachable or demountable rim.

Some of your customers may not understand the principle of the Motz Cushion Tire. Tell them this: These tires have double, notched treads (see A) which prevent skidding and distribute the weight to the sides. The undercut sides (see B) allow free action of the bridges. The slantwise, elastic bridges (see C) give and yield like the air in pneumatic tires.

A letter or post card mailed to-day brings the new Motz Tire Book 95 and Special Agency Proposition to any auto dealer, repairer or garage man.

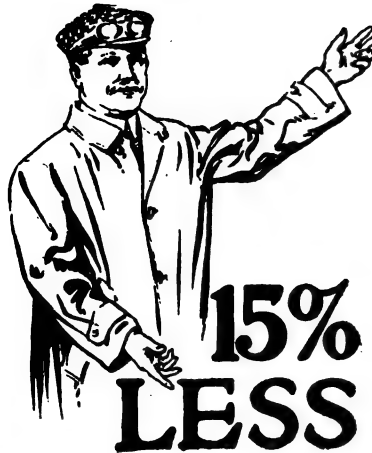
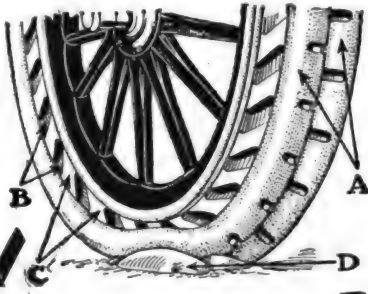
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30x8.....	11.45	13.15
32x8.....	12.25	14.10
30x8 1/2.....	16.35	19.40
31x8 1/2.....	17.45	20.05
32x8 1/2.....	18.00	20.70
34x8 1/2.....	19.60	22.55
30x4.....	23.10	26.55
31x4.....	24.00	27.60
32x4.....	24.85	28.60
33x4.....	25.75	29.60
34x4.....	26.60	30.60
35x4.....	27.45	31.55
36x4.....	28.35	32.60
32x4 1/2.....	31.70	36.45
34x4 1/2.....	33.70	38.75
35x4 1/2.....	34.75	39.95
36x4 1/2.....	35.75	41.10
37x4 1/2.....	36.75	42.25
42x4 1/2.....	41.75	48.00
35x6.....	42.75	49.15
36x6.....	43.90	50.60
37x6.....	45.10	51.90

Specify whether Regular Clincher or Quick Detachable (Q. D.) clincher, is wanted.

THAN OTHER STANDARD MAKES

Great American Wrapped White Tread TIRES & TUBES

COST THE LEAST

Compare prices and satisfy yourself.

LONGEST ON THE ROAD

Tests prove our construction and materials give greater mileage than the average 3500 mile guaranteed tire.

SAVE 15% IN HARD CASH

Our folder D, "Honest Tires at Honest Prices," tells why.


For sale by the best dealers.

Great American Rubber Co.

Conshohocken

Pennsylvania

DEALERS: Our policy is no factory branches but loyal and satisfied customers.



A Real Rubber Tire
Wheel and Tire fob, 35c.
Tire fob only, 10c.
Paper weight, 35c.
Send coin or stamps.
Write for Catalogue "K."
THE OAKLAND ADVERTISING CO.
Akron, Ohio

It Pays to Advertise

IN THE

Automobile Dealer

and Repairer

Write for

Advertising Rates

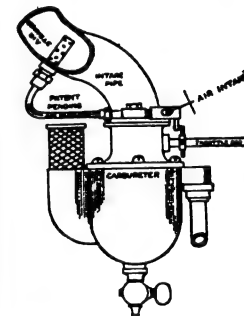


Peck's Air Inspirator

is a gasoline saver, power and speed increaser. And why?

Because it admits air into the intake pipe above the carburetor. Works automatically with the throttle. It will pay for itself in a very short while in the saving of gasoline, besides giving a cooler and smoother running motor.

It will run the car slower on closed throttle and faster on open throttle, for the reason that a carburetor adjusted to run good on closed throttle will not run perfect on open throttle.



All that has to be done with the Inspirator is to adjust the carburetor to run perfect on closed throttle, for the reason that when the throttle lever is opened it admits the air through the Inspirator, which gives a perfect mixture and increases the speed of the car with less gasoline.

This device has been tried out on several makes of cars and they are doing four and five miles more on a gallon of gasoline and can do ten and fifteen miles more per hour on speed.

One great advantage we claim for this device over others that are similar, is that the driver of a car does not have to give any of his attention to the mixture of air, as it works automatically with the throttle lever.

A car can be throttled down to four miles per hour in the city and run to its full capacity in the country, without any extra levers to shift.

We guarantee this device to give twenty to thirty per cent more power and speed, or money refunded after thirty days trial.

Descriptive circular giving full particulars and price sent on application.

Sold by **E. C. PECK**

432 Third St., SAN BERNARDINO, CAL.

AUTOBESTINE

Used by the leading Automobile and Axle Manufacturers in America.

THEY KNOW WHY.

ASK FOR IT BY NAME

AUTOBESTINE.

Send for Descriptive Circular.

WOVEN STEEL HOSE & RUBBER CO.

Trenton, N. J.

NATIONAL SALES CORPORATION,
FACTORY SALES MGR.

New York: 250 W. 54th St. Detroit: 844 Woodward Ave.

CLEAN and POLISH YOUR CAR WITH-
OUT THE USE OF WATER,

By Using
**THE RAPID
AUTO CLEANER and
POLISH**



Will remove mud, grease and dust, and spots of all kinds. When applied, the Rapid Auto Cleaner and Polish dries quickly, by rubbing the surface with a dry, soft cloth. It leaves the surface free from moisture, gum, grease, or soil of any sort which will stick to the hands or clothes. It can be applied to any surface without fear of damaging the same.

Used in thousands of garages and carried in stock by most supply dealers.

Dealers, write for special proposition. If your dealer does not carry this article I will send liberal FREE sample, if you mention this magazine.

WHEN ONCE USED, ALWAYS USED.

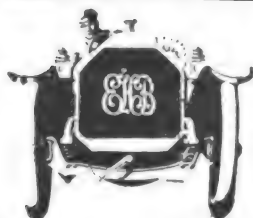
Put up in 12 ounce bottles, . . . \$0.50
Put up in 1 quart bottles, . . . 1.00
Put up in 1 gallon jugs, . . . 3.00

PREPARED ONLY BY

T. R. SHANNON,
19 Lorraine Street, HARTFORD, CONN.

THE LITTLE STEERSMAN

Is a safety steering device, which makes any car 100% easier to control, and prevents accidents when the steering gear breaks, or a tire bursts. Write for full information to the Modern Auto Appliance Company, 10 Kinderhook St., Chatham, N. Y.



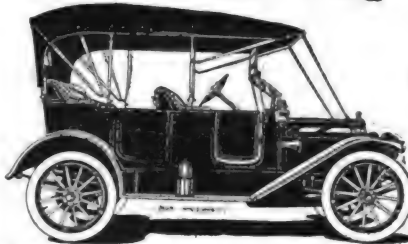
MONOGRAMS

Is your car exactly the same as hundreds of other cars of the same make? What marks your car as your own property? A Monogram will give it a mark of distinction and refinement. Hickok Monograms are the best

and our prices are low. Write for special proposition and booklet B today, now.

THE HICKOK MFG. CO. 44 St. Paul St., Rochester, N. Y.

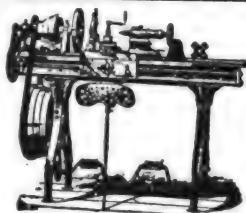
McINTYRE F-12



Write at once for our Proposition for 1913

W. H. McINTYRE CO.

Vehicle Builders Since 1869
2102 W. 7th St. Auburn, Ind.



THE BARNES LATHES

9' swing
11' swing
13' swing

For Repair Work our No. 13 Lathe is right, has 13' swing, auto cross feed, length of beds from 5 to 10 feet long; furnished with counter-shaft or foot-power.

SEND FOR LATHE CATALOG.

W. F. & JOHN BARNES CO.
206 Ruby St., - - - Rockford, Ill.

A Wonderful Gasoline Lighting System

The Handy Lamp

Equal to a private gas plant, entirely under your own control. So simple any one can operate it.

SAVES YOU HALF

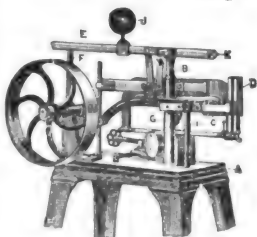
your lighting expenses. Can be turned up and down, and burned high or low like gas. Better light for Home or business use than gas, kerosene or electricity, at half cost.

Write for ADR Lamp Book—it's free.

We have five other lines,
BRILLIANT GAS LAMP CO.
Dept. 28, N. 182 N. State St., CHICAGO, ILL.



L. H. OLMSTED'S Improved Power Hack-Saw Machines For Sawing Metals



List prices from \$15 up.
Send for circular.

L. H. OLMSTED'S SON, Hasbrouck Heights, N. J.

DEALERS—GET OUR SPECIAL OFFER
on this money-making guaranteed
"SAMSON" Electric Horn



No. 1 Samson Horn
Push and Cord
6/10 amperes at 6 volts.

Cast Brass Base.
Spun Brass Projector, 9 in. long.
12 ft. Cord and Push

**STRONG-LOUD
SIMPLE RELIABLE**

MADE ONLY BY
AMERICAN ELECTRIC CO., 6425 S. State St., Chicago, Ill.

GREEN RIVER SCREW PLATES FOR AUTOMOBILE USE



Send for Catalogue 34 F and Prices
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STORAGE BATTERIES



FOR AUTOMOBILES—
ALL STYLES

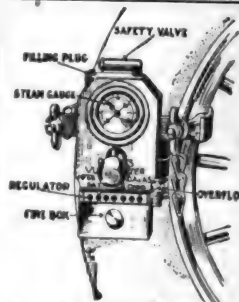
RECTIFIERS

ALL SIZES

FOR CHARGING FROM AN A-C CIRCUIT



AMERICAN BATTERY COMPANY
1136 FULTON ST. CHICAGO, ILL.
ESTABLISHED 1899



Do Your Own Vulcanizing

Either Tube or Casing, with a Dallas Portable Steam Vulcanizer, which has all the features of a first class Boiler.

Price, oxidized finish,
\$12.00

AGENTS WANTED
Manufactured by
MONTGOMERY MACHINE CO.
Dayton, Ohio

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Wholesale manufacturers of
AUTOMOBILE TOPS

Send for illustrated catalogue. Old tops recovered. Write us for prices.

We Can Save You Money.



SPARK PLUGS

**A BETTER PLUG
CANNOT BE MADE**

DELTA MFG. CO
Bloomfield, N. J.



VULCANIZERS

A complete line of Sectional, Inner Tube, Retreading and Inside Patch Vulcanizers, Air Bags and Tire Repair Material.

Write for Catalogues.

THE O'NEIL TIRE & PROTECTOR CO.
AKRON, OHIO

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The best auto horn —and the best advertised

Showing our advertising (reduced) in the Saturday Evening Post, starting June 1st.



The right automobile signal is here

(A statement you can prove for yourself—by our 30-day trial offer below.)

¶ An agreeable two-tone horn that is easy to attach and self-cleaning—operated without expense or bother. The real auto signal—speaking unmistakably at minimum speed, and with maximum carrying-power when necessary. ¶ No matter what car you run—you'll find the Waymaker Horn the most practical and least expensive auto signal, eliminating both cost of batteries and bother of cleaning and repairing. ¶ Made in four sizes and in two styles—the standard Foot Control and the unique pneumatic Hand Control.



30-day trial offer

(In presenting this coupon to your dealer, or mailing to us, state make, year and model of your car; and whether hand or foot control horn is wanted.)

Your Name _____

Address _____

LEE TIRE & RUBBER CO.
CONSHOHOCKEN PA.
J. Ellwood Lee, President

"Turns Miles into Smiles"

The trade has called the **Waymaker** "the best designed auto horn," "the horn that combines all the advantages of exhaust and electric horns," "the horn that sells easiest and stays sold."

The trade has backed its praise with its orders and repeat orders—till the business to date is double our expectations.

Now we are expanding our advertising in a way that should win the co-operation of the most sceptical dealer. *The Saturday Evening Post* advertising—of which we show a reduced cut herewith—will reach **two million** circulation each issue, or **ten million** readers (at the accepted average of 5 readers per copy). And the *Post* advertising won't stop with June.

In addition, *Cosmopolitan*, *McClure's*, *The Literary Digest*, *Life*, *Review of Reviews*, *American Motorist*, *Motor Car*, *Motor Print*, *Auto Trade Journal*, *Motor*, *Horseless Age*, etc., will bring the **Waymaker Horn** advertising prominently before another **two million or more** circulation (or **ten million** readers, if you want the complete figures).

Never before has such a horn been so well advertised—reaching practically every car owner and his friends and family.

Do you want these orders?

Stock up at once on the **Waymaker Horn**. Write to day for our trade proposition, our descriptive booklet I, and the **Waymaker Data Book**, showing how our simple coupling system enables you to fit any car from a minimum stock of coupling.

Lee Tire & Rubber Co., Conshohocken, Pa.
J. Ellwood Lee, Pres.

I REPAIR ALL DAD'S TUBES

For
It's
Easy
With
Security
Self
Vulcaniz-
ing
Patches



The Security Patch vulcanizes itself to the inner tube, while the tire is in use.

Do not be afraid of hot sandy roads, for the more heat and running you give your tire the tighter the patch sticks. All you need is gasoline and waste to clean the tube, and moisten the underside of patch after removing the red cloth strip.

Auto Set, 12 Assorted, - \$1.00 Postpaid.
Motorcycle Set, 10 Assorted, .50

THE SECURITY CO.,
20 Shingles St., Pittsburgh, Pa.

Stock carried at San Francisco office, 785 Mission Street.

BEST IN THE WORLD

The Hotter the Weather the Better It Sticks.

RUBBER CEMENT

For repairing Automobile and Bicycle tubes and tires.

This cement will do anything in the way of cementing. It will cement rubber to leather; rubber heels and soles to leather shoes.

LIST OF PRICES OF TUBE CEMENT

No. 1-1/4x4 Plain tubes	\$6.00 per gross
60c. per doz.	retail 5c. each
No. 1-1/4x4 Nozzle Points	\$7.00 per gross
75c. per doz.	retail 7c. each
Best there is for plugging purposes.	
No. 2-1x4 Plain tubes	\$10.00 per gross
\$1.00 per doz.	retail 10c. each
No. 3-1x6 plain tubes	\$20.00 per gross
\$2.00 per doz.	retail 20c. each
No. 4-2x7 1/2 Pint tubes	\$36.00 per gross
\$3.50 per doz.	retail 35c. each

Price \$2.50 per gallon, in cans.

By the barrel, \$2.00 per gal.

If your dealer does not handle our cement, send us 30 cents in stamps and we will mail you a 1 1/4x6 tube; or 75 cents for 1 dozen No. 1 Tubes. Jobbers and Dealers, write for discounts of Quality Cement.

Made and Guaranteed By

HENRY E. EBY, General Manager

QUALITY CEMENT CO.

Fernwood

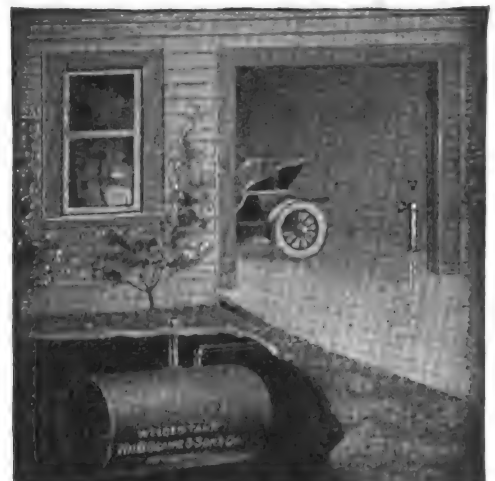
Del. Co., Pa.

The GIBNEY

ELECTRICK VULCANIZERS

Cut down tire bills one-half, and more. A postal will bring to you an illustrated booklet telling how. Send for it now.

JAMES L. GIBNEY & BRO., 226 N. Broad St., Philadelphia, Pa.; 248-252 W. 54th St., New York City



SCAIFE

Gasoline Storage Outfits

contain no complicated parts to get out of order.

A Welded Tank is the ideal construction for holding gasoline.

Wm. B. Scaife & Sons Co.

Founded 1862.

PITTSBURGH, PA.

ALUMINUM MATTING

For Automobile Running Boards, Foot Boards, Motor Boat Floors, etc.

Cleaner, neater and more serviceable than any other matting.

Write for samples and information.
METALLIC AUTOMOBILE MATTING CO.

295 Mill St.

Rochester, N. Y.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

American Re-inforced Inner Tubes at the Indianapolis Races.

Contracts covering Inner Tubes for the races were all made before we got into the game, but in the try-outs the American Inner Tube easily out-classed every other make of tubes.



Billy Lesaw, driver of the Marquette Buick, and Joe Horan, driver of the Lozier car, used American Inner Tubes for six days in their try-outs. So pleased were they with the staying qualities of the American Tube that both have signified their intention of using nothing but American Re-inforced Tubes in all future races.

The great heat resisting properties locked up in our tubes, the vulcanized splice which makes separation, and consequently blow-outs, impossible, and the double walled "Tread," are the points of superiority over other tubes and which made it possible for our Tubes to win such a signal victory at the races.

Watch for Lesaw's and Horan's opinions of American Inner Tubes in their own words in this Journal for July.

The "American Indian" (red) Tube is the inner tube PERFECTED.

We are exclusive manufacturers of the 5-Minute Cure Vulcanizing Cement.

A Complete line of Repair Materials of superior quality.

The American Tire & Rubber Co.,
49 Beach Street, Akron, Ohio.

Disease Cannot Be Overcome with Drugs OXYDONOR

Opens the way to good health. Oxydonor is a reform—not a medicine. Oxydonor is the means to an end. Oxydonor is Nature's way for destroying disease of every character promptly, painlessly and inexpensively. Originated and invented by a physician and scientist. Endorsed by physicians.

If you are sick, if you are suffering from any form of disease, acute or chronic, why not investigate the merits of Oxydonor? Why not be guided by the testimony of thousands of people who have been brought from sickness to good health by Oxydonor?

Oxydonor with full directions will be
SENT ON 60 DAYS' TRIAL.

If not entirely satisfied with results at the end of that time, the purchase price, \$25.00, will be cheerfully refunded.

Free Books sent prepaid for the asking. Write to

DR. H. SANCHE & CO., Inc.,
489 Fifth Avenue, New York City.
61 Fifth Street, Detroit, Mich.
364 West St. Catherine Street, Montreal.

Please mention the Automobile Dealer and Repairer when writing to advertisers.



DEALERS: We have a very liberal proposition to offer you on

Gemco
MILWAUKEE

AUTOMATIC WIND SHIELDS

Black enameled Shields with nickel or brass trimmings are a special feature of our 1912 line. Write for further information and discounts.

PRICES OF "GEMCO" SHIELD.

Brass, \$25.00 Nickel-plated, \$28.00

BLACK ENAMEL

With Nickel Trimmings, \$28.00

BLACK ENAMEL

With Brass Trimmings, \$27.00

Write for Complete 1912 Catalogue, now ready.

GARAGE EQUIPMENT MFG. CO.

746 So. Pierce St. Milwaukee, Wis.



THE PEERLESS FOUR CYLINDER TIRE PUMP

COMPACT. Fits in the palm of the hand; weight of pump, crank, clamp, gauge, and hose, 9 lbs; goes nicely in tool box.

CONVENIENT. Clamps solidly on running board. Turn the handle and inflate the tire with ease and comfort.

POWERFUL. Built like an Air Compressor, yet a child can inflate the largest tire made.

DEALERS. The Peerless is the big Accessory this season; get it in stock. Write today for Dealer's Proposition. Sold under a "Money Back" Guarantee.

Manufactured and Sold by
PEERLESS ACCESSORIES MFRS.,
1926 Wabash Ave., CHICAGO, ILL.

WELDING AUTOMOBILE PARTS



Cracked or Broken

Cylinders, Crank Shafts, Crank Cases, Housings, Frames, Axles, any metals of any shapes or thicknesses, including

ALUMINUM PARTS

All work
absolutely
GUARANTEED

Manufacturers of welded (seamless) gasolene and oil tanks.
Write for estimates.

Complete Oxy-acetylene Welding and Cutting Plants Installed.

Western Welding & Mfg. Co., 557 & 559 W. Jackson Boulevard, Chicago, Ill.

Save TIME and MONEY

Automobile Truck Users.

Send your wheels that need repairing to

PHINEAS JONES & CO.,

Phones 1571 / Market.
1572

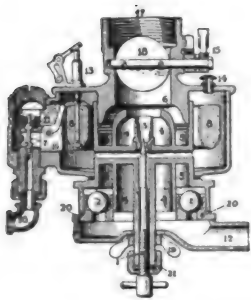
NEWARK, N. J.

Or to Branch Factory, 12th Ave. and 55th Street,

Phone 4926 Columbus.

NEW YORK CITY.

Full Equipment of the Latest and Best Machinery.



PLANHARD CARBURETORS

are not only different but give greater motor efficiency than any other on the market. The Planhard is the only auxiliary air ball control in the world.

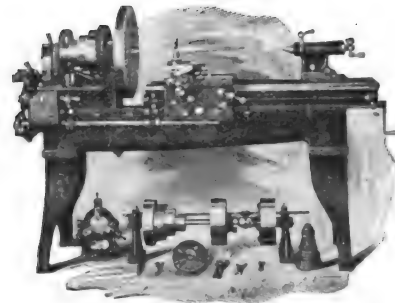
Write for trial sample.

Live agents wanted.

THE PLANHARD MFG. CO.

General Sales Office: Factory: New York Sales Office:
THE BOURSE, Kokomo, E. H. STICKLES,
Philadelphia, Pa. Ind. 1777 Broadway,
Boston, Mass., L. P. RHINES, Room 406, Old South Bldg.

Our New 14-24" Sliding Extension Gap Lathe



Write for Lathe Bulletin and Attractive Prices.

Barnes Drill Co., Inc., 1907,

Builders of the All Geared Drill.

This Lathe swings 14 1/4 in. over top bed, 24 in. through gap, and the gap opens 18 in. and 36 in. wide.

Has 2-15/16 in. spindle with 1-9/16 in. hole thru same. Six quick changes of Geared Feeds, four Step Cone of large diameters.

The 5 1/4 ft. bed takes up to 34 in. between centers, while our 7 1/4 ft. machine takes 96 in. between centers when extended.

Just the thing for garage and repair work and saves investing in a large expensive lathe.

Machine is built strong, rigid and accurate, and can be furnished with taper attachment.

818 Chestnut St.,
Rockford, Ill., U. S. A.



Repairs tubes and casings and prevents blowouts. Your hands do the work; at ONE-TWENTIETH the cost of vulcanizing, and in ONE-TENTH THE TIME. Book of instructions with each Outfit.

**YOUR
MONEY
BACK**

TRY A TIRE SAVER OUTFIT AT OUR RISK
Send \$1.00 for this GUARANTEED TIRE SAVER OUTFIT. If you are not satisfied ask for your Dollar back. It will come promptly.

WILLIAMS MFG. CO., 1810 CARMAN ST., CAMDEN, N. J.

Dealers and Jobbers, Write for Prices.

"THE CHAIN THAT LASTS"

The "BEST"
Traction Chain



What wears out first on your chains?

Let us tell you why ours last longer than others.

H. E. McLAIN & CO., 162 POND ST., NATICK, MASS.

PACIFIC COAST AGENT

JOHN F. REVALK, 405 Golden Gate Avenue, San Francisco, Cal.



THE KRAEMER RELEASER & RETAINER
WITH ADJUSTABLE JAW

We teach you how.

Ask your dealer for THE KRAEMER Valve Spring Releaser and Retainer with Adjustable Jaw; if they haven't got them accept no other.

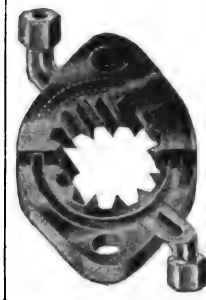
Every tool guaranteed to give satisfaction or money refunded. Sent to any address on receipt of Express or P. O. Money Order for \$1.65.

Discount to dealers. Mention Automobile and Repairer.

DISTRIBUTERS WANTED.

UNITED STATES COMPASS CO., Cedarburg, Wis.

With this tool and our simple, practical instructions for grinding in engine valves which are gratis with each tool, any one can do the work. All Automobile users know the necessity of having engine valves ground to a perfect seat, to get the most efficiency from their motor.



THERMO-GASKET

"It Heats and Mixes"

- q SUPERIOR to hot water jacketed carburetors.
- q VAPORIZES the HEAVY GASOLINE you now buy.
- q Gives a POWERFUL MOTOR which does not carbonize.
- q COSTS LITTLE but SAVES MUCH in gasoline and worry.
- q NO MINUTE TESTS NECESSARY TO DISCOVER THESE RESULTS.

WRITE FOR INFORMATION

F. W. Battershall & Co. -

56 Maiden Lane,
ALBANY, N. Y.

SPLITDORF

MAGNETO

"Always There"

SPLITDORF ELECTRICAL CO.

Walton Ave. and 138th St., NEW YORK

CHICAGO BOSTON LOS ANGELES
DETROIT KANSAS CITY SAN FRANCISCO

HAYWOOD STEAM VULCANIZERS THE PROFIT MAKING PLANTS



The vulcanizing system that DOES NOT use air bags. SOLID PADS and HEAVY CLAMPS are the means through which pressure is generated.

Plants from \$25 to \$500

Write for Catalog

HAYWOOD TIRE & EQUIPMENT CO.

528 N. Capitol

Indianapolis, Ind.

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TABLE OF CONTENTS

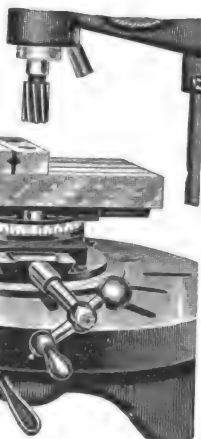
	PAGE		PAGE		PAGE
The Professional Man	33	Wiring Information	44	Cars for Hire	57
Economy in Tire Use	34	An Offensive Knock	44	Ill-Timed Complaints	57
Low Price But High Grade.....	35	Coils and Vibrators	44	Things to Consider	57
A Protest From a Stranger.....	35	Wiring for Lights	44	Drew 80,000 Spectators	57
Excessive Prices	36	Friction Drive Slips	44	Worm Drives	57
Splitdorf Company Enlargement.....	36	A Leaky Carburetor	45	Lessons for Drivers	58
A Practical Grade Crossing Suggestion.....	36	Trouble With Two Cylinders	45	Acetylene Burners	59
The Franklin Air-Cooled Car.....	37	Two Cylinders Miss	45	The 500 Mile Race	60
Heating of a Motor Car Engine	37	A Metallic Knock	45	Wood or Wire Wheels	60
Driving Experience	37	Misfiring	45	Air-Cooled Engines	61
Cost of Upkeep	38	A Fierce Clutch	46	Driving the Car	61
Rust Ruins Rubber	38	Motor Lacks Power	46	The \$5,000 Peerless	63
the \$5,000 Olds	39	Horsepower and Floating Axles	46	The \$5,000 White	64
The \$6,000 Pierce-Arrow	39	Spots on the Body	47	Electric Self-Starters	64
The \$6,000 Thomas	39	Trouble in Starting	47	Farmers Take Time to Think It Over.....	65
The \$5,000 Packard	39	Object of a Master Vibrator.....	47	Charging Electrics	65
Expects Rather Too Much.....	40	Carburetors and High Altitudes.....	48	Wire and Wood Wheels	65
Carbon Removers	41	Gasoline and Lubrication	48	Platinum More Valuable	65
Electric Current	41	Rattling in a Runabout	48	Lathe Work	66
Trouble in Starting	41	Certain Points of Interest	48	Price Cutting and Price Fixing.....	69
A Missing Cylinder	41	Electric Delivery Wagons	49	Bolts Are Not Strong Enough.....	69
Certain Air-Cooled Engine Questions.....	42	Paint and Varnish	52	Light Oils for Motor Trucks.....	69
Experience with a Stationary Engine.....	42	Paints and Varnishes	53	One Show, Two Buildings.....	70
Sooted Cylinders	42	Exhaustive Tests	55	English Automobile Industry	70
Poor Compression	43	If Short of Gasoline.....	55	A Union Joint	71
Trouble in Starting	43	Car Tracks Injure Tires	55	Danger In Gasoline	71
Over Heated Exhaust Pipe	43	Second-Hand Cars	55	Steam Car Department	71
Car Lacks Power	43	The Best Stimulant	56	Temperature for Vulcanizing	72
Steering Wheel Play	43	Varnishes and Lacquers	56	Advises the Use of a Truss.....	72
Ignition Trouble	43	Things American	56	A Handy Book	73
Not Enough Electric Power	43	Vacation Time	56	New Advertising Manager.....	73

The DAVIS MILLING ATTACHMENT and COMPOUND TABLE

Has Circular Base for clamping to any Drill Press Table, with Dovetail Cross Slides, operated with Screws and Ball Cranks, by hand. Saddle is graduated and swivels to any angle. Table is slotted for clamping down work, Chuck or Vise. Handy for large shops, when the big machines are tied up, for spotting castings, milling off ends of bosses, etc.; for small shops that cannot afford expensive machines; die makers, locksmiths, pattern makers, repairmen and automobile garages. It will cut key seats and mill cams. For use with end mill, fishtail cutter or formed cutters.

WRITE FOR PRICE.

Manufactured by
THE HINCKLEY MACHINE WORKS,
Hinckley, Ill.



"STAR" LATHES

9 in., 11 in., 13 in. SWING.

Suitable for fine accurate work in the garage, repair shop, tool-room and machine shop.

Send for Catalog B.

THE SENECA FALLS MFG CO.

A-1

429 Water Street, SENECA FALLS, N. Y.

DO YOU REQUIRE MORE POWER?

THE

BRENNAN

4 cylinder 4x5, 35-40 H. P., for any standard make of car,

AUTOCAR.

CHALMERS,

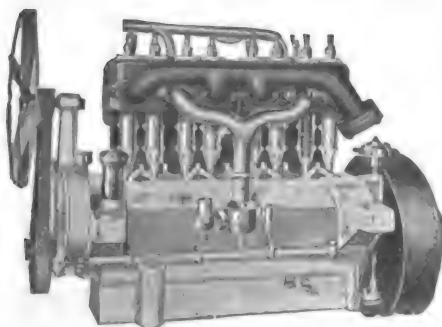
ABBOTT-

DETROIT,

E. M. F., REGAL,

ELMORE, HUDSON, WARREN, ETC., or for any special make of car. Also Transmissions. WRITE US TODAY:

BRENNAN MOTOR CO., SYRACUSE, N. Y.



Get the Remy Exchange Proposition

An opportunity to exchange your old and perhaps unsatisfactory ignition for the new Remy, the best magneto made. The exchange usually costs less than you now pay for repairs.

Write today for full particulars.



Remy Electric Company

Factories, General Offices:

ANDERSON, IND.



Please mention the Automobile Dealer and Repairer when writing to advertisers.

TIRE CUTS

ruin casings. They admit moisture to the carcass, cause the fabric to rot and weaken, grow larger—end in blowouts.

You can repair CASINGS
and INNER TUBES

anywhere in 15 minutes, better than a Repair Shop can do—and for *one cent*.

Universal Auto-Vulcanizer

PATENTED



While in Place on Car

A practical vulcanizing outfit complete, with enough repair gum to make 40 patches. It weighs 3 pounds and can be carried in the tool box.

Simplest And Most Satisfactory Device For Eliminating Tire Troubles That Has Ever Been Devised.

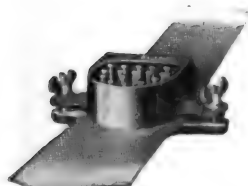
Absolutely automatic. Place the patch—attach the Vulcanizer—put in the gasoline—light it. No further attention required. In 15 minutes the job is done.

It *can't burn, scorch or injure* tube or casings. It *can't* get out of order. It *can't* fail to do its work. So simple anyone can operate it.

The Universal Auto-Vulcanizer saves its cost a *hundred times* over in trouble and expense.

Price Complete, \$4.00 Ready for Instant Use
Guaranteed Satisfactory or Money Refunded

If your dealer can't supply you, fill out the coupon below and mail to us. We will express it at once *prepaid*.



Repairing Inner Tube

ADAMSON MANUFACTURING CO.

East Palestine, Ohio

Patented April 2, 1912.

We will promptly protect our rights under this patent by the vigorous prosecution of all infringers thereof.

ADAMSON MFG. CO., East Palestine, Ohio.

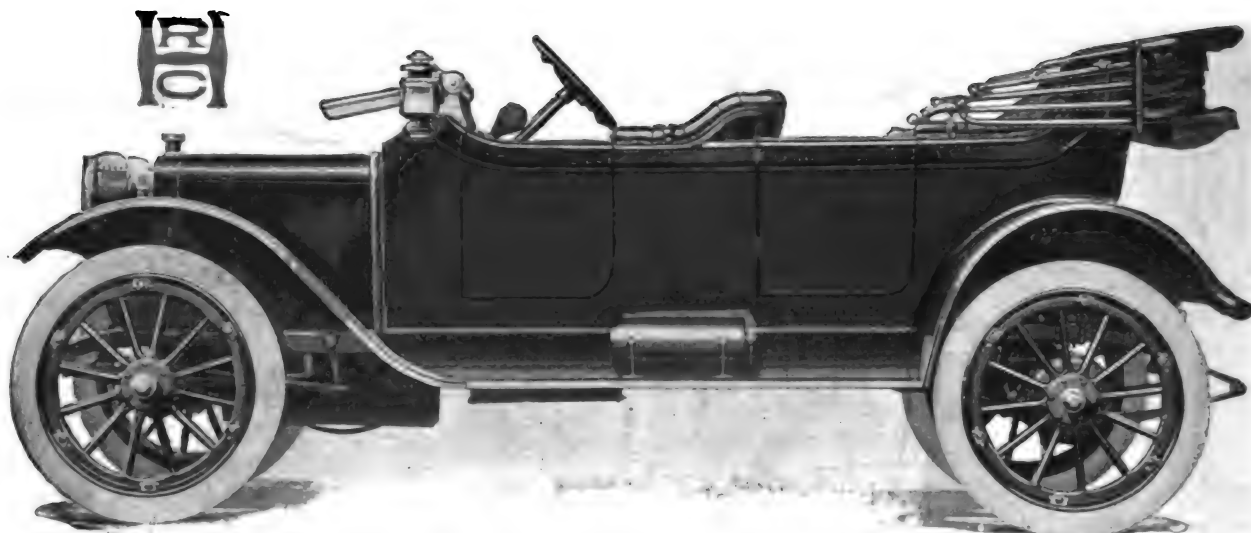
Gentlemen: I cannot get a Universal Auto-Vulcanizer from my dealer. Enclosed is \$4.00. Please send me one, express prepaid.

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Town.....State.....(F)



Vulcanizing with Complete Outfit



5-Passenger Touring Car, 110 Inch Wheelbase

R-C-H Wanted—1000 Dealers

"Twenty-five"

5 Passenger Touring Car—110 Inch Wheelbase

Standard Model
\$850 F. O. B.
DETROIT

Fully equipped with top, windshield, generator, side curtains, 5 lamps, horn, tools and tire repair kit, long stroke motor, 3 speeds, enclosed valves, Bosch Magneto.

Model E E
\$900 F. O. B.
DETROIT

Equipped with 32x3 1/2 tires, demountable and quick detachable rims, extra rim, Bosch Magneto, gas tank, wind shield, lamps, horn, tools and kit; and the famous Jiffy Curtains, which can be adjusted in an instant and make the car entirely weather proof. Long stroke motor, three speeds, enclosed valves.

General R-C-H Specifications
Motor—4 cylinders, cast en bloc—3 1/4 inch bore, 5-inch stroke. Two-bearing crank shaft. Timing gears and valves enclosed. Three-point suspension. **Drive**—Left side. Irreversible worm gear, 16-inch wheel. **Control**—Center lever operated through H plate, integral with universal joint housing just below. **Springs**—Front, semi-elliptic; rear, full elliptic and mounted on swivel seats; **Frame**—Pressed steel channel. **Axles**—Front, I-beam drop-forged; rear, semi-floating type. **Body**—English type, extra wide seats. **Wheel-base**—110 inches. **Full equipment** quoted above.

Our selling problem this season has been a peculiar one. Naturally, our original aim was to get as wide a distribution as possible. But the demand for the R-C-H so far exceeded all expectations that our entire output for 1912 was speedily oversold. And this left many sections without R-C-H representation, simply because we could not supply the cars.

We shall manufacture this season in round numbers 10,000 cars. For the season of 1913 our output will be increased to 30,000 cars. Our present dealers tell us that they will take care of 15,000. That leaves 15,000 for sections where the R-C-H is not at present represented. And that in turn offers a golden opportunity to the right dealer in much of the best territory in the country.

We are keeping this announcement free from bombast, from "bunk," from "hot air," from all the glittering generalities that are handed you every day. We prefer, even, not to dwell upon the sales record of the car and its popularity with the public. You probably know it; or if you don't, ask your brother dealer in a town where there is an R-C-H dealer.

But ask yourself these questions: What does your public—the people to whom you must sell—demand in a car? And given two cars possessing all these features, would the average man prefer to pay a lower or a higher price?

Of course the answer to the second question is self-evident. So let us consider the first. The average man wants in a car five things—sturdiness, comfort, beauty, power, roadability. We claim that no car at twice its price excels the R-C-H in these essentials. If this claim is true—and we ask only a man's judgment after he has seen the car himself—is not the R-C-H the best car on the market from the dealer's standpoint as well as that of the public?

This advertisement may seem a trifle premature. But we want ample time to consider carefully every application made to us. We want the best dealers—men who will stay with the proposition year in and year out; men who will take the same pride that we do in the R-C-H watch-words of good work, good value and good-will; men who will put as much care into selling the R-C-H as we do into making it.

So write us today; tell us about yourself. For if you're the right man in the right place, we think the R-C-H offers you the best opportunity for a big business success that exists in the industry to day.

R-C-H Service Stations

R-C-H service and supply stations in all large centers will be a feature of our 1912-13 policy. Many of them are already in operation—a photograph of one is shown below. Others will be established as rapidly as possible; so that no R-C-H owner anywhere will be far from a base as well equipped to attend to his wants as the factory itself. In California or Maine, Minnesota or Texas, the R-C-H owner will be able to obtain repair parts within 24 hours.

R-C-H Corporation 191 Lyncast Street Detroit, Michigan

Branches

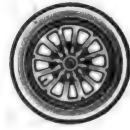
ATLANTA, 548 Peachtree St.
BOSTON, 563 Boylston St.
BUFFALO, 1225 Main St.
CHICAGO, 2021 Michigan Ave.
CLEVELAND, 2122 Euclid Ave.

DENVER, 1520 Broadway
DETROIT, Woodward and Warren Aves.
KANSAS CITY, 3501 Main St.
LOS ANGELES, 1242 South Flower St.
MINNEAPOLIS, 1206 Hennepin Ave.
NEW YORK, 1989 Broadway
PHILADELPHIA, 320 North Broad St.



R-C-H Service Station
Lyncast St. and Jefferson Ave., Detroit, Michigan

Automobile Dealer and Repairer



A JOURNAL OF PRACTICAL MOTORING

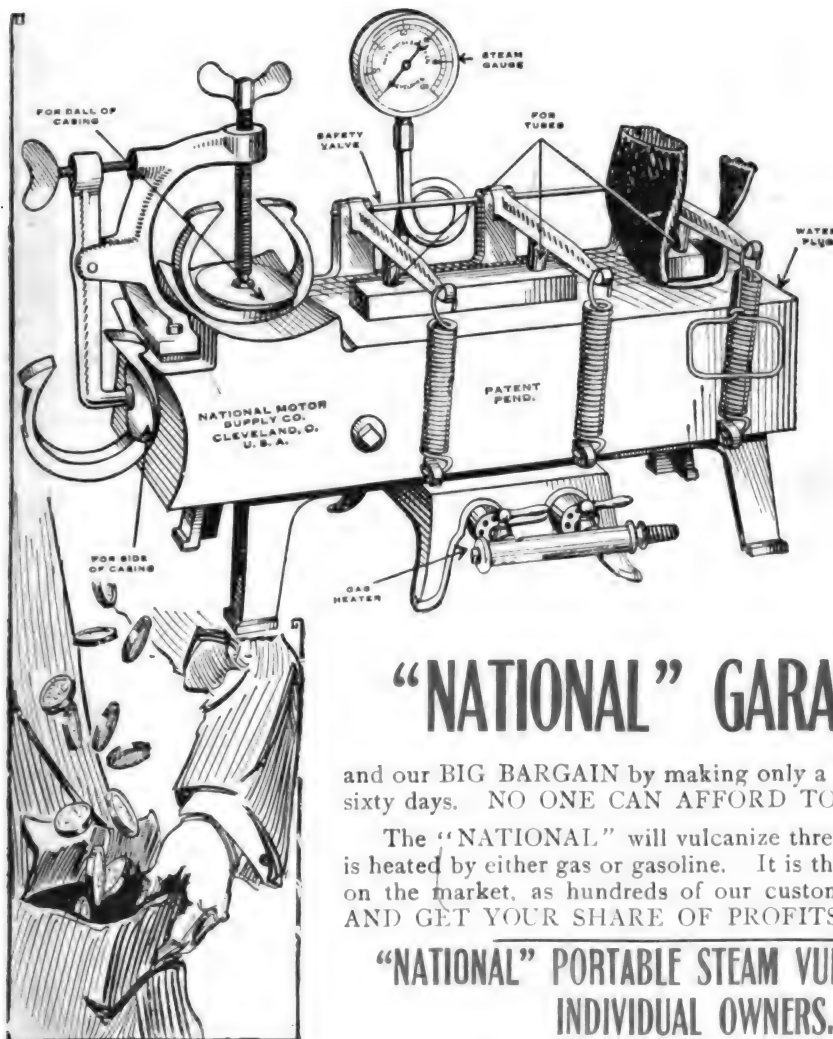
REGISTERED IN U. S. PATENT OFFICE.

THE MOTOR VEHICLE PUBLISHING CO., 71-73 Murray Street, New York.

Vol. 13, No. 5.

NEW YORK, JULY, 1912.

Monthly, \$1.00 per year.
Single Copy 10 Cents.



NOTICE TO GARAGES

For 30 days we will give the
BIGGEST BARGAIN
ever offered the repairman.
Write us immediately for our
SPECIAL OFFER whereby
you can get one of our famous

"NATIONAL" GARAGE VULCANIZERS

and our BIG BARGAIN by making only a small deposit, and pay the balance in sixty days. NO ONE CAN AFFORD TO MISS THIS.

The "NATIONAL" will vulcanize three tubes and two casings at a time, and is heated by either gas or gasoline. It is the best and cheapest steam vulcanizer on the market, as hundreds of our customers will tell you. WRITE TODAY, AND GET YOUR SHARE OF PROFITS.

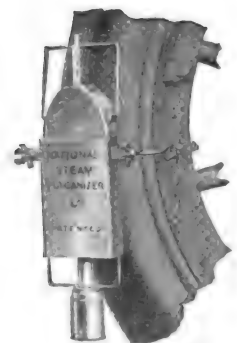
"NATIONAL" PORTABLE STEAM VULCANIZER FOR INDIVIDUAL OWNERS.

Over 30,000 sold on trial. Which is the most economical, to pay \$12 for a "NATIONAL" and get perfect satisfaction, or save a few dollars on an imitation vulcanizer and then ruin a \$30 tire? **FREE TRIAL!** Send us references, and we will ship a "NATIONAL" on ten days' trial, with full instructions and complete outfit of supplies. Repair your tubes and casings, then send us \$12 or return the vulcanizer.

Manufactured by

The National Motor Supply Co.

Home Office and Factory, 1902 EUCLID AVE., CLEVELAND, OHIO



Mr. Car Owner :

If you have tried many oils, you know that they are *not* all alike, even though they look so.

There is a *vast* difference between good oil and cheap oil—which means much when you figure up expenses. By economizing fifteen cents a gallon on oil, you cannot save over \$5 a year. It's not worth the risk. Good oil increases engine efficiency; poor oil ruins it. Try Panhard.

Mr. Dealer :

You know that the only way to hold a customer is by giving him a quality product. When a customer asks you for the best oil—be able to sell him Panhard.

We are talking to a third of the population of the country and almost all the automobile owners of the United States, through our magazine and trade paper advertising. Why not benefit by it? Sell Panhard.

The best oil to buy

The easiest to sell



Here are six reasons why Panhard Oil is best:

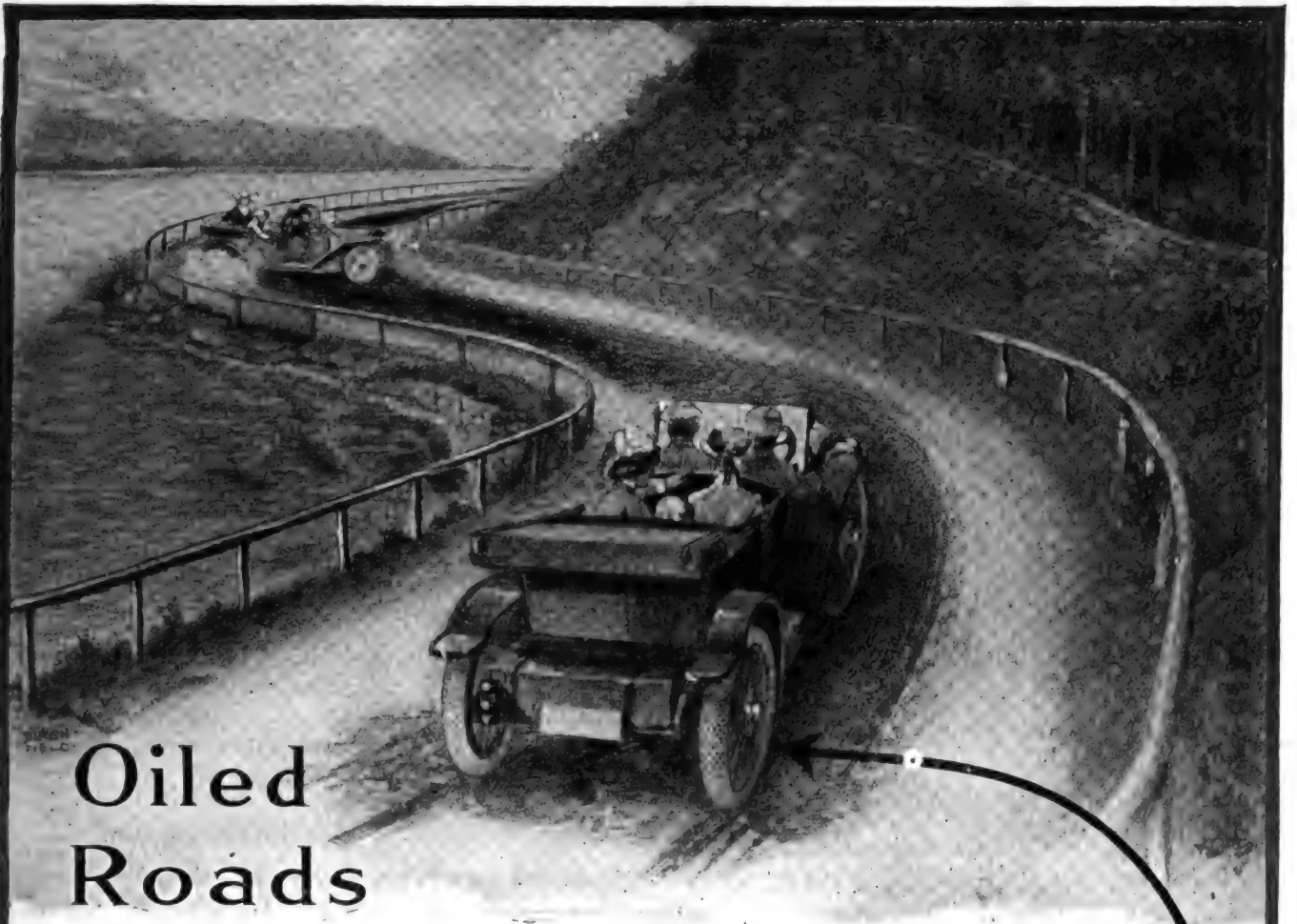
- First*—It is refined from the best crude in the world—Pennsylvania Crude.
- Second*—Always absolutely uniform in quality.
- Third*—Will not carbonize unless fed too freely.
- Fourth*—Filtered just enough to remove all free carbon.
- Fifth*—Not filtered enough to destroy the perfect lubricating body.
- Sixth*—Holds its body at high temperatures.

You cannot sell poor stuff many times to the same people. Co-operate with us, Mr. Dealer, and sell Panhard Oil. Write today for our "Help-sell" plan.

GEORGE A. HAWS, 67 PINE STREET, NEW YORK CITY

Distributing Stations :

Boston ; Chicago ; San Francisco ; Omaha ; Columbus, O. ; St. Paul ; Minneapolis ; Salt Lake City ;
Bismarck, N. D. ; Kansas City, Mo ; St. Louis ; Los Angeles ; Portland, Ore. ;
Shreveport ; Norfolk ; Spokane.



Oiled Roads

have their drawbacks for bare tires.

Aside from the risk of skidding on fresh oil, the rubber is likely to suffer damage if the oiled stretch be long. You will probably drive thousands of miles on oiled roads this summer, and you have perhaps resigned yourself to the inconvenience and expense.

You can save both, and tour at a less cost per mile for tires than ever before, by equipping your new tires with

Woodworth Treads

The soft chrome leather base of Woodworth Treads is not injured by road oil; but it keeps the oil from the tires. The hardened steel rivets prevent skidding, and enable you to travel the greasiest roads in the same security as on dry clean macadam.

Woodworth Treads are a safeguard against cuts and punctures also. And punctures are even more costly than annoying, for they expose the fabric to rotting and ultimate blowouts. By eliminating fabric decay, Woodworth Treads multiply the life of new tires about threefold. They last as long as ordinary bare tires, and cost about half as much.

Write today for further particulars. Our booklet on Tire Preservation is of value to every motorist. A handy leather key ring free if you mention this magazine.

A pair of WOODWORTH TREADS will be sent on 30 days' trial to any responsible dealer, garageman or private owner wishing to test our claims. Send the size desired, and your business references—no cash. If the Treads are not wholly satisfactory, return them in 30 days, and our charge will be cancelled.

LEATHER TIRE GOODS COMPANY
NIAGARA FALLS, N. Y.

NEW YORK STORE: 1608 Broadway.

ODESSA, ONT., August 14, 1911.

LEATHER TIRE GOODS Co., Niagara Falls, N. Y.

GENTLEMEN:—Your treads do not injure tires. I have two tires that have never been off in 5400 miles and no punctures. They have on the second pair of treads.

Yours truly,

J. E. MAREE.

Good Agents Wanted for Unoccupied Territory.

BOYDTON, MECKLETONBURG Co., VA., June 14, 1911.

LEATHER TIRE GOODS Co., Niagara Falls, N. Y.

GENTLEMEN:—The treads bought of you last summer are giving me entire satisfaction, preventing punctures, protecting tires, rendering motoring on country roads much safer, and enabling the car to move with a steadiness which it never obtained on the smooth rubber tire.

Yours very truly,

E. CHAMBERS GOODE.





INSIST

On Your Dealer Supplying You With

“Miller Quality”

Tire Accessories

Reliners
Pluggum
Molded Tube Patches
Blow-out Patches
All-Ready Patches

Cements
Gas Lamp Bags
Gas Lamp Tubing and Tubes
Talc (In Sifter Top Tubes)
Schrader Valves and Parts

Also TIRE REPAIR MATERIALS

FREE To Dealers

This beautiful show case, with assortment of accessories shown. Write for Descriptive Circular on this exceptional offer.

The Miller Rubber Company
 AKRON, OHIO, U. S. A.

TRADE MARK



Mossberg Socket Wrench Set

No. 10

Universal Automobile Set

For use in Automobile repair and Garage equipment.

In wooden case containing:

- Mossberg Ratchet Handle No. 350.
- One extension bar.
- One universal joint.
- Two screwdriver bits.
- 19 Mottled, case hardened, pressed steel sockets.
- 2 special spark plug sockets.

Just ask for Catalog No. 143.

FRANK MOSSBERG & CO.

Attleboro, Mass.

Agencies:—NEW YORK, CHICAGO, SAN FRANCISCO,
 DALLAS, WAYNESVILLE, N. C.

Every MOSSBERG Product

carries its own guarantee stamped on its face—do you recognize it? If you possess anything that bears this trade-mark you may be sure that you are going to get a lifetime of service out of that particular article. If you don't—it's your own fault, for we cheerfully replace anything that breaks at any time, for instance.



SOCKET SET. No. 10 AUTO REPAIR SET.

Please mention the Automobile Dealer and Repairer when writing to advertisers.



Get 5,000 Miles More Out of Your Old Tires

IF YOUR tires are worn out, don't throw them away, or you'll throw away \$50 to \$200. **Durable Treads** are guaranteed to give you 5,000 miles more out of them without puncture. If they're new, **Durable Treads** will save them.

The necessity of buying a new set of tires every season is a burden of the past. The bane of the Auto owner's life has vanished.

Old tires are now made better than new—new ones are made to wear twice as long. Punctures, blow-outs and road delays have been eliminated. And tire expense—that great black evil—has been reduced over half.

This has all come to pass through **Durable Treads**—the most talked-of tire protectors in the world.

For with **Durable Treads** you can run your car anywhere with never a fear of puncture or blow-out. When you start out you are sure of no road trouble—you are sure to return on time.

Guaranteed 5,000 Miles Without Puncture

We give you a written, iron-clad guarantee with **Durable Treads** for 5,000 miles without puncture. This guarantee stands whether your tires are new or old, rim-cut, tread-worn or rut-worn. It guarantees that they will not heat, rot, or injure your tires in any way.

Read that paragraph again! Get its full significance! It's remarkable! No such guarantee has ever before been given with a tread. For no other is just like **Durable Treads**.

Just think what **Durable Treads** mean to you: your tire expense reduced over half. It is now 1 1/4 to 4 cents per mile. It will be \$50 to

\$2.00 this season if you fail to protect your tires with **Durable Treads**.

Durable Treads cost only half as much as tires. They are made for either straight side or clincher rims. They make riding just as comfortable—high speed is just as easy—skidding impossible. The additional weight is trivial.

Durable Treads are the only protectors guaranteed not to cause friction and heat. Their peculiar rim anchorage and non-stretchable material prevent it.

Durable Treads

Exclusive Features

No. 1—Extra Tread Strip covers wearing surface, adding 50% to the life of **Durable Treads**. No. 2—Hardened Steel Rivets, closely set on Tread surface, prevent skidding. No. 3—Three to five plies of Tire Fabric prevent stretching and sagging. No. 4—Full leather cover protects tire from ruts and blowouts. No. 5—Nickel steel rim attachment places driving strain on wheel instead of on worn, weakened tire. It also prevents rim cuts and blow-outs.

Test at Our Risk

There are many other advantages of **Durable Treads**—advantages that mean safety and economy to you.

Durable Treads must do as we guarantee. If they fail, we lose, not you.

We will ship you a pair or full set, express prepaid, for your inspection. You pay nothing in advance—you assume no obligations. If you are not satisfied that **Durable Treads** will save half your tire expense and all your tire troubles, return them. That will end it! Thus we take all the risk—this examination costs you nothing—

COLORADO TIRE & LEATHER CO.
1027 Broadway, Denver, Colo.

Special Discount

If **Durable Treads** are not already represented in your locality, we will allow you, on this initial shipment, our full dealer's discount.

Durable Treads. It is indeed exceptional—an opportunity to equip your car with the best protector known, at almost cost.

Send Coupon — Get Facts

Send the coupon for our interesting booklet, "5,000 Miles Without Puncture," copy of our guarantee, details of our test offer and facts that will open your eyes. Send it now—every mile you run your tires unprotected costs you money.

COLORADO TIRE & LEATHER CO.
1027 BROADWAY, DENVER, COLO.

Dear Sirs:—Send me at once, without obligating me, your valuable booklet, "5,000 Miles Without Puncture," copy of your Guarantee, Test Offer, Discount and other facts.

Name
Street Address
City State
My Tire Sizes are

3

YOU STOP

Surely and Silently If your brakes are lined with the best lining.

TRADE MARK
Raybestos
REG. U.S. PAT. OFF.



Is composed of high grade asbestos woven with copper wire. It wears for thousands of miles on the heaviest cars. It is built for hard usage. Mud, oil, dust, water, does not injure it and you secure the highest co-efficient of friction.

Put RAYBESTOS in those old brakes of yours. Note the difference. No trouble to attach it. Your dealer sells RAYBESTOS and he has it in all widths, with name stamped in every foot of fabric.

Write for handsome booklet.

THE ROYAL EQUIPMENT COMPANY

450 Housatonic Avenue

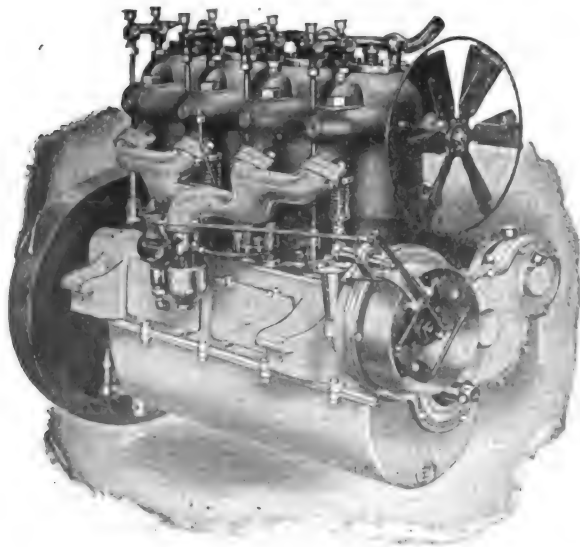
BRIDGEPORT, CONN.

We also manufacture Duplex and Raymond Brakes, and Gyrex, The Mixer.

OUR LINE IS COMPLETE.

WRITE for the following catalogs of the line in which you are interested:

- No. 18.—General construction of all motors from $3\frac{1}{2} \times 4\frac{1}{2}$ to 5×6 , cone clutches and transmissions.
- No. 20.—30 to 40 H. P. unit power plants with 4 forward speed transmissions and governor.
- No. 21.—22 H. P. unit power plants with 3 forward speed transmissions
- No. 19.—Wells clutch.
- No. 17.—4 cylinder, marine engines, 12 to 500 H. P.
- No. 16.—4 cylinder, stationary engines, 12 to 500 H. P.
- No. 15.—4 cylinder, stationary engines (suction gas type), 25 to 500 H. P.

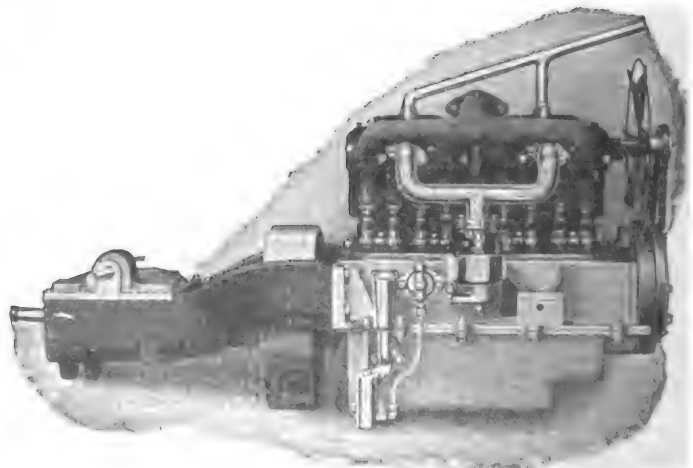


No. 11.—Single cylinder, stationary engines, 2 to 125 H. P.

That we furnish engines for farm tractors, railway locomotives and commercial vehicles of all kinds, is evidence of the range of our work and the stability of our construction.

Model Gas Engine Works

Lock Box 2002, PERU, IND.



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HESS-BRIGHT BALL BEARINGS

On Main Journals
Unworn After
 $3\frac{1}{2}$ Years—
Approximately
150,000
Miles



BALL BEARING INTERURBAN CAR
ATLANTIC CITY & SHORE RR.

G. M. B.

No. 141 WASHINGTON STREET
HARTFORD, CONN.

April 4, 1912

TELEPHONE-CHARTER 2854

The Hess-Bright Manufacturing Company,
Philadelphia, Pa.

Gentlemen:— I submit herewith a summarized report, giving briefly
the results obtained in the measurement of two Hess-Bright Ball Bearings,
No. 7322, Railway Type, sent me for this purpose, the complete report of the
investigation having been made March 20, 1912.

Bearing No. 1.

The mean, or average, Radial Freedom was found to be 0.000046 in.
—practically nil.—
The mean End Play 0.00125 in.
The mean, or average, Eccentricity of Inner Race was found to be
only 0.00004 in.—also practically nil.

Bearing No. 2.

The mean Radial Freedom for this bearing was found to be 0.00003
in.,
The mean, or average, End Play 0.0097 in.
The mean, or average, Eccentricity of Inner Race 0.00025 in.

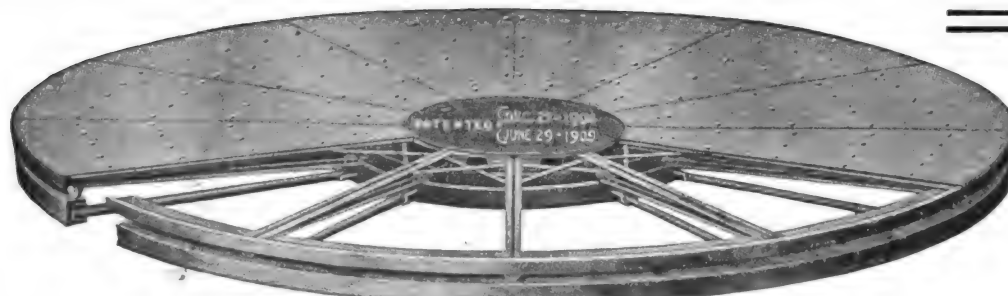
The averages above given are those of readings for each, taken at
each 45 degree division of the circle. The maximum and minimum readings
in all cases being so nearly alike, practically, that the resulting averages
fairly represent the condition of these bearings at the time of the test.

Very truly yours,

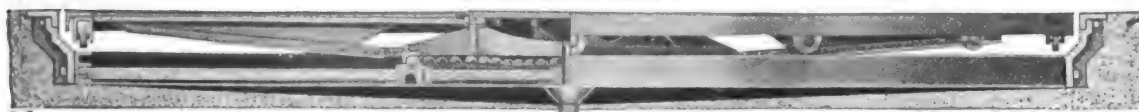
Geo M Bond

The bearings above re-
ferred to were taken from a
single journal box of the interurban
trolley car above shown. They had been in
constant service since October, 1908, with no atten-
tion save to repack with grease every 10 to 12 months. Bear-
ing No. 2 carried end thrust in addition to the weight on the
axle. These bearings were put back in service after the test.





TOTAL DEPTH 12-IN.



CONCRETE ANY DEPTH AND GROOVED TO WATER DRAIN

UNIVERSAL

Are you ready to order YOUR "UNIVERSAL?"

"UNIVERSALS" are easiest to turn, easiest to install and easiest to keep in order—they never need repairing.

Made in four sizes to accommodate any size and weight car.

Only twelve inches in depth to allow installation in either ground or upper floors.

So easy to operate a child can turn them.

due to their superior construction and to the Serpentine Ball Bearing Race Course.

May we send you catalog "C-1"

and further information? We also make the "UNIVERSAL" Auto-Jack and Emergency Truck, and "The Handiest Tool in the Shop" Portable Floor Crane and Hoist—two other great garage conveniences.

THE CANTON FOUNDRY & MACHINE COMPANY, CANTON, OHIO

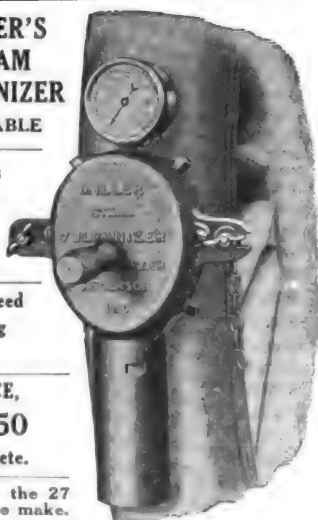
MILLER'S STEAM VULCANIZER PORTABLE

Repairs
Casings
and
Tubes.

Guaranteed
Nothing
Better.

PRICE,
\$7.50
Complete.

One of the 27
kinds we make.



Innerliners in one piece 100 ft. long, 3 or 4 ply, 50c. per lb., less 5% for cash.

MILLER'S TIRE RELINERS—4 PLY ADHESIVE—EXTRA QUALITY

Net Prices—Cash with Order 5 per cent. off.		Each	
28x2 1/2 inches.....	\$1.95	31x4 inches.....	\$3.20
28x3 " " " " " " " "	2.80	32x4 " " " " " " " "	3.40
28x3 1/2 " " " " " " " "	2.55	33x4 " " " " " " " "	3.60
32x3 " " " " " " " "	2.75	34x4 " " " " " " " "	3.95
28x3 3/4 " " " " " " " "	2.55	35x4 " " " " " " " "	4.15
30x3 1/2 " " " " " " " "	2.80	36x4 " " " " " " " "	4.30
31x3 1/2 " " " " " " " "	3.05	40x4 " " " " " " " "	4.80
32x3 3/4 " " " " " " " "	3.20	34x4 1/2 " " " " " " " "	4.45
34x3 1/2 " " " " " " " "	3.40	35x4 1/2 " " " " " " " "	4.55
36x3 1/2 " " " " " " " "	3.95	36x4 1/2 " " " " " " " "	5.15
30x4 " " " " " " " "	3.05	36x5 " " " " " " " "	5.40

MILLER'S TIRE RELINERS—3 PLY ADHESIVE—REGULAR QUALITY

Net Prices—Cash with Order 40 and 5 per cent. off List Prices. Can Furnish Any Size Not Mentioned.

MILLER'S REPAIR MATERIALS

Standard Tread Stock, per lb.....	\$.70
High Grade Tread Stock, per lb.....	.65
Cement Stock for Casings 1 25	
Cement Stock for Tubes... 1.75	
Inside Tube Patching Rubber, cured one side, per lb. 2.00	
No Cement Patches, per dozen packages.....	2.50
No Cement Patching Rubber, sheet form, per lb.... 2.00	
Fabric Sea Island Cotton, 17 1/2 ounces, one or two sides.....	1.10
Fabric Common Tire Cloth, 18 ounces, one or two sides.....	.65
Fabric Common Bicycle Tire Cloth, 10 ounces, one or two sides.....	.65
Pure Fine Para Gum, for making acid Cure or Cold Patching Cement.....	2.00
Miller's Three in One Repair Stock.....	1.20

This stock repairs casings and tubes and makes cement, and eliminates the necessity of carrying a large variety of repair material.

The above prices subject to 5 per cent. discount for cash with order, or in 100 pound lots or over, 10 and 5 per cent.

Write for our 44-page Catalogue, which illustrates large kettle vulcanizers; adjustable sectional vulcanizers; inner tube vulcanizers; inside vulcanizers; retreading vulcanizers; adjustable segment iron cores, tread rollers, power wrapping machines, steam boilers, grinding stands, circular wire brushes, grinding wheels, full line of small rubber tools, tire lasts, automatic steam traps, steam regulators, air bags, gas tubing, auto bumpers, baby carriage tires, inside and outside blow-out boots, no cement patches, repair stocks, hand-made bicycle tires, motor cycle casings and red tubes of extra quality.

MILLER'S IMPROVED ADJUSTABLE, SECTIONAL VULCANIZER

The kind that repairs everything in the Tire line—all sizes of bicycle, motor cycle, auto and aeroplane tires, also 4 to 6 inner tubes at one time. Made and designed by the man who originated and patented the Cavity Vulcanizer, so generally used throughout the world.

One of the
37 Kinds
We Manufacture.

Prices Complete with
Bead and Tread
Molds, \$95.00

Price Complete with-
out Bead and Tread
Molds, \$42.00



**CHAS. E. MILLER, Anderson Rubber Works,
ANDERSON, IND., U. S. A.**

Please mention the Automobile Dealer and Repairer when writing to advertisers.



**Insist on this
Label**

THE "INNERSHU"

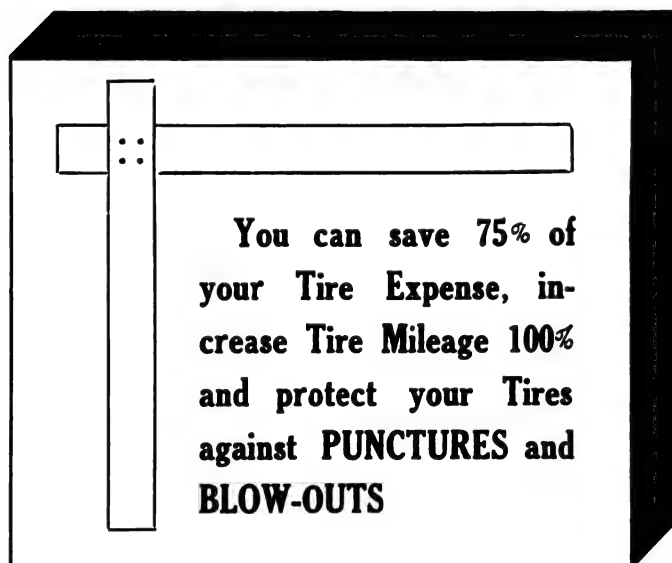


**It is found on
Every "Innershu"**



A 100% Increase in Tire Efficiency

GUARANTEED

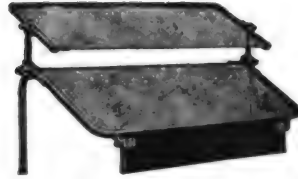


**We will ship DIRECT IF not represented in
your territory**

INNER SHOE TIRE CO., Grand Rapids, Michigan

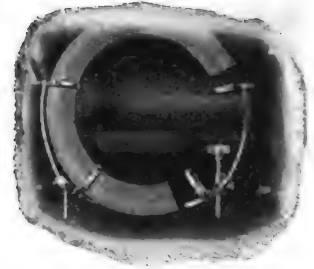
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PATENTED FEB. 27, 1912.

Badger Running Board
Tire Holder

Badger Wind Shields

PATENT APPLIED FOR

Badger Rear End Demountable
Rim and Tire Holders

AUTO PARTS MFG. CO.

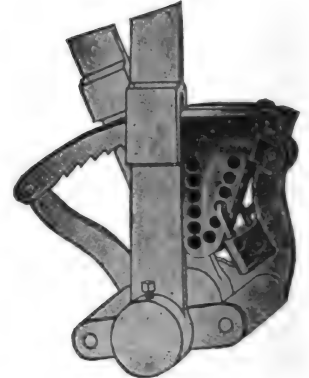
(Badger Accessories)

Patent was granted on our Badger Running Board Demountable Rim and Tire Holder Feb. 27th, 1912, by the United States Patent Office. All persons are cautioned against using or selling infringed Badger Tire Holders, as there is a liability.

Badger Ford Bumper



Badger Lock Clamp



AUTO PARTS MFG. CO.

161-171 Michigan St., Milwaukee, Wis., U. S. A.

SEND FOR CATALOGUE

Direct Advertising

The Automobile Advertising Company will address, fold and mail your printed matter or letter to every automobile owner in the United States, or in any particular section, at a moderate cost, and save you the trouble and expense of keeping up lists.

If you want to address owners of new cars as soon as they register, we can do that for you, or if you want to reach the owners of certain makes of cars, we can do that for you.

If you want lists of owners in any State or for any make of car, we can furnish them.

We also get all returns that our customers receive from the Post Office, and those names are taken from our files immediately. **YOU DON'T BUY DEAD NAMES.**

We have the names of 493,000 actual automobile owners in our files. They are your public, and only through our service can you reach them.

If you will write us we will give you the benefit of an experience that is saving thousands of dollars for some of the biggest advertisers in the country.

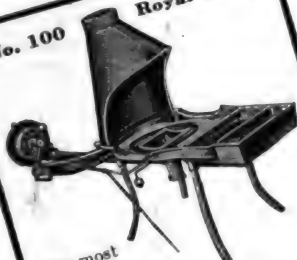
Automobile Advertising Company

385 Fourth Avenue

New York City

Please mention the Automobile Dealer and Repairer when writing to advertisers.

No. 100 Royal Forge



The most popular forge of to-day.

Western Chief Forge, Size XBB



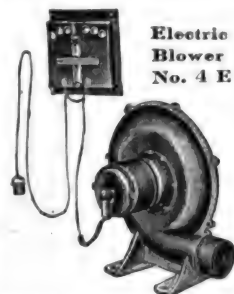
For power shops, or where a forge for heavy work is desired.

Royal (Steel) Forge No. 37



For garages, boiler makers, horse shoers or any first-class forge shop.

Electric Blower No. 4 E

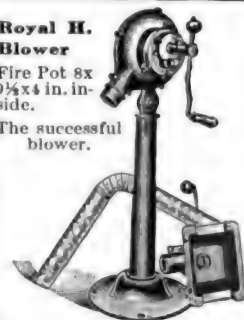


One fire variable speed blower.

Royal H. Blower

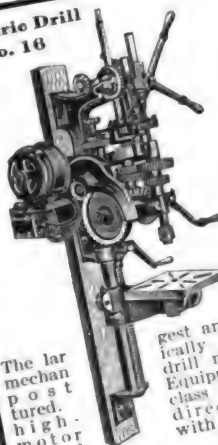
Fire Pot 8x 9 1/4 x 4 in. inside.

The successful blower.



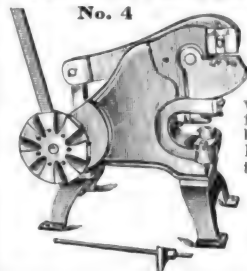
Spur gears used only. Ask the man who owns one.

Electric Drill No. 18



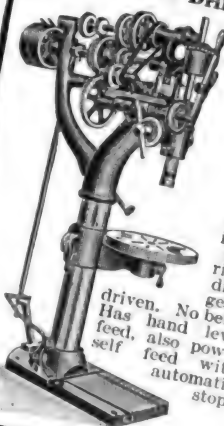
The largest and most perfectly manufactured drill. Equipped with class powerful directly connected with spur gear.

Combination Punch and Shear No. 4



It can be operated toward the front or back. Depth of throat 6 inches.

No. 31 Drill



20-inch up-right drill gear driven. No belts. Has hand lever feed, also power self feed with automatic stop.

When the Name CANEDY-OTTO

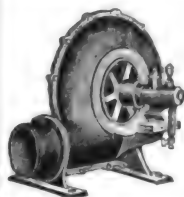
is found on a Forge Blower, Drill or any other Blacksmith Tool that is all the guarantee necessary

We Warrant All Articles of Our Manufacture

SOLD BY JOBBERS AND SUPPLY DEALERS EVERYWHERE

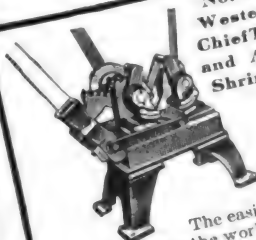
CANEDY-OTTO MFG. CO.
CHICAGO HEIGHTS, ILL. U.S.A.

Power Blower



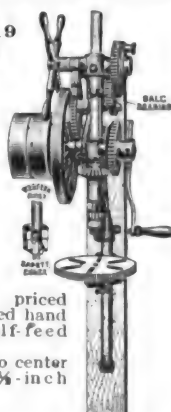
Made in 5 sizes. Adapted to forge fires and light Cupola work. Built for service.

No. 1 1/2 Western Chief Tire and Axle Shrinker



The easiest operated shrinker in the world.

No. 19 Drill



A low priced combined hand and self-feed drill. Drills to center of 10 1/2-inch circle.

COUPON

CANEDY-OTTO MFG. CO.,
Chicago Heights, Ill.

Gentlemen:

Please send me a free copy of your 160 page Tool Catalogue.

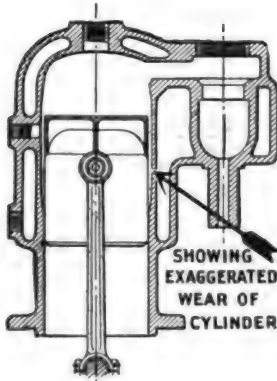
Name _____

P. O. Address _____

State _____

Give name of your jobber or supply dealer here _____

GOOD WORK IS TALKED ABOUT



That is why we have had so many automobile cylinders to re-bore. One owner, satisfied with our work, brings another.

Every motorist wants his car to be powerful and quiet running. Don't you?

When a cylinder wears large in diameter (as it is bound to do in time) oil, fuel and power are extravagantly wasted.

The piston will slap and the engine become noisy. It takes but a few thousandths of an inch of wear before your motor is reduced from a powerful, quiet mechanism to a weak, inefficient source of power.

The Underwood method of reboring cylinders is the one process you can depend on for accuracy and the restoration of original conditions of a high grade motor.

The cylinders are rebored accurately on special machines and new pistons and rings are fitted with the skill and experience that long practice has made possible. The results of our process are equal to securing a new motor at a fraction of the cost.

We guarantee our workmanship and material to be first-class, so you need have no hesitancy in regard to our ability. We have rebored a host of cylinders without one failure.

Start the cylinders and an old piston (for a sample) in our direction **now**.

H. B. UNDERWOOD & CO.

Established 1870

1019 Hamilton Street

PHILADELPHIA

TIRES. TUBES. TIRES. 1912 STANDARD MAKES.

FREE SPECIAL OFFER FOR THIS MONTH ONLY.

\$3.00 Button Tire Cover given away with every purchase of tires. These tire covers are guaranteed waterproof and dust-proof and will be furnished in any size.

Highest grade stock, comprising of the best manufacturers. Cannot advertise names on account of the reduced prices we are selling them at.

Every tire is guaranteed brand new, perfect in every respect, and are not more than six months old. Some of these have the names of the makers on and others are buffed.

We thoroughly examine and test every tire and tube under heavy pressure to detect any weakness before shipping.

These are not the kind usually advertised. Nothing but the best stock is quoted in this ad.

Casings to fit Clinchers, Quick Detachable or Dunlop Straight Side Tires.

Size	Casing	Tube	Size	Casing	Tube
28x3	\$9.50	\$2.50	85x4	\$22.00	\$5.25
30x3	10.75	2.75	86x4	19.50	5.40
32x3	10.50	8.00	87x4	22.50	5.75
28x3½	12.00	8.00	32x4½	20.00	5.50
29x3½	14.50	8.15	33x4½	23.00	5.60
30x3½	14.50	8.75	34x4½	28.50	5.75
31x3½	15.00	8.75	35x4½	24.50	6.00
32x3½	15.00	8.90	36x4½	25.00	6.10
34x3½	15.75	4.15	37x4½	25.00	6.20
36x3½	15.00	4.25	34x5	20.00	6.00
30x4	16.50	4.60	35x5	25.50	6.25
31x4	17.00	4.75	36x5	26.00	6.50
32x4	17.50	4.90	37x5	28.00	6.75
33x4	19.00	5.00	37x5½	30.00	7.00
34x4	19.50	5.10			

Take advantage of these prices and free offer, as we cannot guarantee how long these prices will stand good.

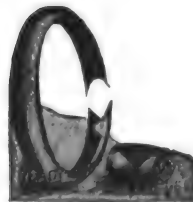
We guarantee these tires and tubes to be strictly 1911 and 1912 goods.

We are one of the oldest and largest tire mail order houses in the United States, and you do not have to hesitate to send us an order with cash accompanied, as we can refer you to any Commercial Agency or Bank in New York, as to our references.

We agree to refund your money if goods are found unsatisfactory upon receipt.

We Ship Goods Subject to Examination.

INSIDE TIRE PROTECTORS.



Prevent blow-outs, punctures, and greatly increase mileage. These tire protectors are made from 3 to 6 ply of Egyptian fabric, with a self-seal flap reinforcing the rim and sides, always the weakest parts. Tube pinches are eliminated by the use of these protectors.

Order a complete set of them and save 100% on your tire expense.

Size	Reg. Price	Cut Price	Size	Reg. Price	Cut Price
28x2½	\$4.65	\$2.40	85x4	\$7.00	\$4.90
28x3	4.75	2.60	86x4	7.75	5.00
30x3	4.90	2.85	32x4½	7.25	5.00
30x3½	5.25	3.85	34x4½	7.50	5.10
32x3½	5.50	3.55	35x4½	7.60	5.25
34x3½	5.75	3.95	36x4½	8.00	5.50
30x4	6.20	3.75	34x5	8.10	5.60
31x4	6.25	4.00	35x5	8.25	5.75
32x4	6.40	4.20	36x5	8.50	6.00
33x4	6.60	4.40	37x5	9.00	6.50
34x4	6.75	4.75	37x5½	9.25	6.75

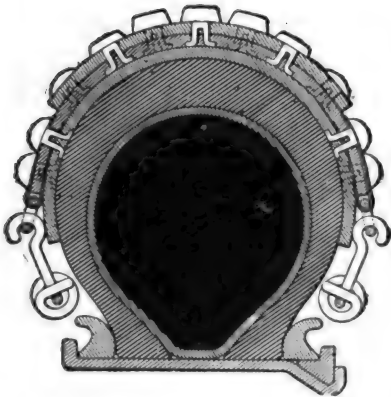
Owing to the fact that our profits are very small, we sell for cash only, and under no circumstances otherwise.

C. O. D. orders filled if 10% is accompanied with order, to show good faith.

Send for complete list.

EXCELSIOR TIRE CO.,
1777 Broadway, New York City, N. Y.

The A. S. B. Triple Leather Tire Protector.



THE A. S. B. Treads are made of 3 thicknesses of leather from the best imported hides. It is Chrome Tanned in the U. S. and is guaranteed to us. It is ten times tougher than rubber. A ten-penny nail will bend before it will go through it. It is next to impossible to puncture it. Our leather is waterproofed. It will not get hard nor crack after being exposed to water or snow. These Treads are all full-steel-studded, with hard steel studs in the center. The side rivets are of a softer steel to better prevent skidding.

Our Treads are self-adjusting, as our springs on the sides of the Tread are made of No. 10 gauge steel wire of the very best and are $\frac{5}{8}$ of an inch in diameter. This makes a perfect, strong spring and keeps the Tread tight on the tire at all times. The springs are much nearer the center of the wheel than the face of the Tread. This gives them greater leverage, or rather tension, and is bound to keep them tight. These springs never lose their spring quality as they are made of the right diameter for a No. 10 gauge premier steel wire. They allow flexibility. That relieves the tires of practically all side strain and eventually prevents blow-outs, for the side strain is what wears and breaks the side-walls of the casing and causes blow-outs. These springs keep the Tread on straight and tight. They do not slip and crawl on the tire and destroy the power of your car at times when your power is most needed. We feel safe in saying the A. S. B. Treads are the only self-adjusting non-creep Treads made.

Our Guarantee! We guarantee the A. S. B. Treads to not heat, chafe, rot or injure your tires in any way. If they are not everything we claim them to be, you can return them at the end of 10 days' trial and we will refund your money. The A. S. B. Treads are not an experiment. They have been tested out for the past two seasons. They are giving universal satisfaction and are doing the business. As they do not slip and crawl on the tire we are safe in backing up every A. S. B. Tread that leaves our works with the above Guarantee.

They will more than double the life of your tires and will do away with at least 95 per cent of your tire troubles and that means cutting your tire up-keep expense to a minimum. We Guarantee 4000 miles wear without puncture. Some of the drivers abuse their Treads the same as they would their tires and we are obliged to place the mileage that low, but with decent usage under ordinary conditions they will give from 8 to 10 thousand miles wear. That depends entirely on the condition of the roads traveled and on the manner in which the driver handles the car.

The side-openings prevent the sides from puckering or pocketing. They will not pick up dirt nor sand. They aid in cooling the tire. By an actual test it was proved that tires equipped with A. S. B. Treads run several degrees cooler than the naked tires.

We want an Agency in every town in the U. S. If there is no Agent in your territory, we will make you a Special Price on a full set of four in order to get them on a car where all the Car Owners can see just what we they are. The Treads will get the Repeat Orders, and that is what we are after.

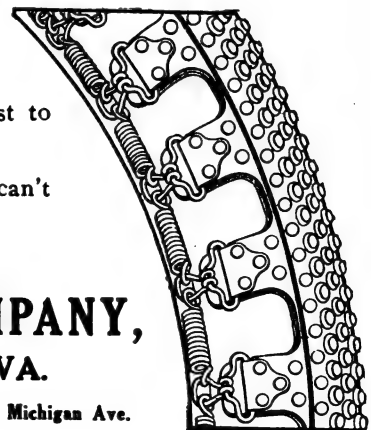
If you are tired of paying excessive tire bills, it will be to your interest to write us for prices, terms, etc.

If you are a Dealer, we have a proposition to offer you that you can't afford to pass up.

Our References—Any Bank in our City.

Factory Address **QUEEN MANUFACTURING COMPANY,**
Lock Box 224, WEBSTER CITY, IOWA.

Agencies—Dallas, Texas, c/o Box 616. Cincinnati, Ohio, 77 Perin Bldg. Chicago Branch, 1346 Michigan Ave.
Address all B. & L. Caster Front Automobile Axle enquiries to our Chicago Office.



KRAKNO

THE

PERFECT

SURFACER

DOES NOT CRACK NOR CRAZE

Cracks show because the roughstuff swells or shrinks or because the jar and twist of the vehicle makes "vibration cracks." Roughstuff dries hard and brittle—it's *not* elastic.

JOHNSTON'S KRAKNO IS ELASTIC

Three or four coats give a perfect surface and basis for the finishing coats, doing away with filler or roughstuff—and it will *not* crack or craze.

NO MORE BURNING OFF

Of old paint on repair work. Applied according to directions KRAKNO saves one to two coats of lead and four to seven days time required for lead to dry, and it makes a *better looking, better wearing* job than the old tedious and expensive method. KRAKNO is adapted equally well to wood or metal and has been successfully used for years in many of the

LARGEST AUTO AND CARRIAGE FACTORIES

in the United States. Their names and opinions, sent on request, are very convincing—a trial of KRAKNO is absolute proof. Which shall it be?

Gallon Cans . . . \$3.50
5 Pound Press Cans . . . 1.25
Red, Yellow, Slate and White.

THE R. F.
JOHNSTON PAINT CO.
CINCINNATI, OHIO

SPLITDORF

MAGNETO.

"Always There"

SPLITDORF IGNITION vindicated its claim to **SUPERIORITY** once more in the fastest 500-mile race that has ever been run—the 500-mile Memorial Day grind at Indianapolis.

Joe Dawson's winning SPLITDORF EQUIPPED National, at an average speed of 78.72 miles per hour, demonstrated the wonderful firing qualities of SPLITDORF IGNITION at their best, as worlds of verbal argument could not do.

The **BIGGEST AND FASTEST** race of its kind in the world fell as a fitting laurel into the all-conquering and convincing SPLITDORF sweep.

Merz's Stutz, finishing fourth; Endicott's Schacht, finishing fifth; Zengle's Stutz, finishing sixth; and Wilcox's National, finishing ninth, were also SPLITDORF EQUIPPED—rounding out 50 per cent **PRIZE WINNERS** for SPLITDORF IGNITION.

Can the qualities of SPLITDORF IGNITION be doubted in the face of such a commanding demonstration?

SPLITDORF IGNITION "delivers the goods." The headiest and most successful race drivers demand it—they know its constant, hot, fat firing qualities at any and every speed—they know it is reliable and that its use **PRECLUDES IGNITION TROUBLES.**

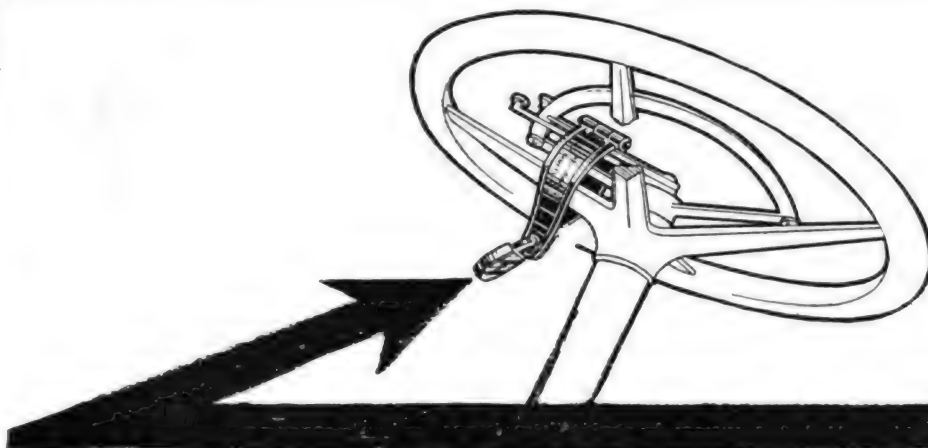
JUST INSIST UPON TRYING IT—we will gladly shoulder all responsibilities for changes and adjustment and **GUARANTEE SATISFACTION.**

Write us for our "**Racing Record.**"

SPLITDORF ELECTRICAL CO.

Walton Ave. and 138th Street,
NEW YORK.

NEW YORK.....1679 Broadway
CHICAGO.....1110 S. Michigan Avenue
SAN FRANCISCO.....430-436 Nan Ness Avenue
DETROIT.....368 Woodward Avenue
BOSTON.....Motor Mart, 220 Pleasant Street
LOS ANGELES.....1226 South Oliver Street
KANSAS CITY.....1823 Grand Avenue
London Paris Turin Brussels Johannesburg



Get This Sure Protection Against Car Robbers

The automobile has opened a new field for thievery. Un-guarded cars are stolen every day. Over 5,000 owners suffered last year. Thousands more will undoubtedly suffer this year. Insurance records show that 90% of the stolen cars are abandoned after a smash-up, or after most of the equipment has been stolen. In either case the loss is heavy. Why risk it? Absolute protection forever costs but \$2.00—one cent a day for 200 days.

The Watch Dog Lock

PATENT APPLIED FOR.

In ten seconds, right from the seat, you can lock the gas, spark and steering wheel, with the motor "dead" or running. Either way, your car can never be started or steered until the "Watch Dog" is unlocked.

Safer Than a Garage

No keys on earth, save two we give you, will fit **your** "Watch Dog." So the "Watch Dog" protection is absolute. It makes your car safe **anywhere**—for any length of time. You are relieved of worry—insured against loss.

Your Car Deserves It

Many pay \$500.00 to \$5000.00 for a car without giving a thought to its safety when left alone. So the newspapers are full of automobile robberies by joy riders and equipment thieves.

Your car is surely worth more than \$2.00! The value of **your** car merits this small investment! **Your** car deserves this **sure protection!**

MAIL COUPON NOW!

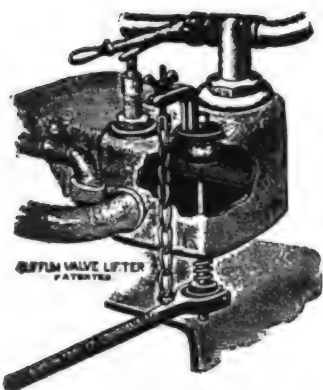
Forget about the price of the "Watch Dog." Think of what your **car** cost. And remember what danger it is in until the "Watch Dog" locks it against all chance of thievery. Mail the coupon **now**. Address

S. Breakstone
1712 MICHIGAN AVE. CHICAGO, ILL.

Order Coupon
S. Breakstone,
1712 Michigan Ave., Chicago, Ill.

Name.....
Address.....
Here is my name and address.
I enclose \$2.00 for "Watch
Dog" Lock,
complete.

Please mention the Automobile Dealer and Repairer when writing to advertisers.



Buffum Valve Lifter
(Peterson Patent)
Best Valve Lifter on the market.
Saves time and trouble.

BUFFUM TOOLS ARE GOOD

Here Are a Few of our Patented Specialties.

SOLD BY ALL UP-TO-DATE DEALERS.



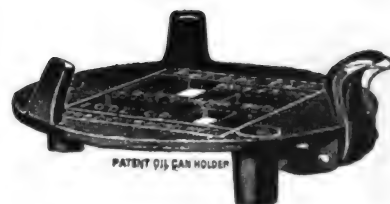
Buffum Cotter Pin Holder
(Patented)

Did you ever try to put in a Cotter Pin where you had to feel your way? What you said would not look well in print.

We Manufacture Hundreds of Designs of Tools for all Trades.

Our Slogan "High-Grade Tools for High-Grade Workmen."

Made in two designs—one screws down—the other fastens on front side of dashboard. Always be wise and carry your oil can along—some time you will go farther than you expected—The damage to your machine will be great—These neglects are what put machines into scrap heaps.



Buffum Oil Can Holder
(Patented)

Holder built so you can take out or put in can with one hand while other holds up hood.

Don't Forget
The Name

BUFFUM TOOL CO.

Don't Forget
The Place

LOUISIANA, MO.



Baldwin Chain and Mfg. Co.

makes automobile chains both riveted and detachable—all sizes in stock.



SPROCKETS

Sprockets made to order.

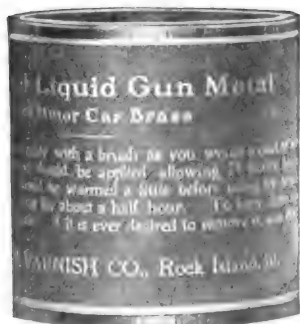
We carry in stock sprockets for the following cars: Cadillac, Reo, Buick, Brush, and Chase Motor Truck.

Send for Quotations and Circulars

Baldwin Chain & Mfg. Co., Worcester, Mass.

AGENTS: { Mr. H. V. Greenwood, 150 Michigan Ave., Chicago, Ill.
Mr. C. J. Iven, Rochester, N. Y.
Mr. M. A. Bryce, 788 Mission St., San Francisco, Cal.

TIRED OF POLISHING BRASS?



With Arsenal Liquid Gun Metal on your lamps and radiator you have no polishing to do. It is applied with a brush the same as paint or varnish and makes a lasting gun-metal enamel on all brass parts. Can be removed at any time without injury to the brass. Is gun metal in color, but dark enough to supply any demand for black as well. Used and endorsed by thousands of motorists. If not at your dealer's \$1 brings a can express prepaid. Liquid Gun Metal is the standard material for enameling motor car brass. Don't pay a painter \$75 to paint your car. Do it yourself with the Arsenal system. Ask us how.

ARSENAL VARNISH CO., 2501 4th Ave., Rock Island, Ill.

AIR ALWAYS ON TAP

ALL YOU WANT—AT RIGHT PRESSURE—NO WAITING

CURTIS COMMON SENSE GARAGE PUMP

WILL LAST A LIFE TIME

For Stationary or Portable Service—Belted Direct to Motor or Line Shaft—Will Furnish All the Air Ordinarily Required About a Garage—or Air for Your Sprinkler and Water Supply Systems.

CONSTRUCTION DETAILS

Vertical up-plunger type—will not carry oil over into the tires. Fewest possible number of parts, hence less friction, less power required, less oil and fewer adjustments. Fan shaped fly-wheel arms direct a cyclone of air on cylinder radiation flanges. Springless intake valve in the piston head that insures prompt valve action.

WRITE US TO-DAY FOR PARTICULARS AND PRICES.

CURTIS & CO. MFG. CO., 1530 Kienlen St., St. Louis, Mo.



Please mention the Automobile Dealer and Repairer when writing to advertisers.



$\frac{1}{2}$ of 1%

That's the number of replacements that we have had to make during the four years we have had K & W Reliners on the market. The best of material, combined with the best of workmanship, are responsible for the superiority of K & W Reliners.

When a dealer tries to sell you "something just as good" as "K & W"—take the hint. Write us direct. Don't wait for blow-outs and punctures, but reinforce your tires now. Take time by the forelock and double your mileage. K & W Reliners will add 3000 to 5000 more miles to your tires—service practically equal to that given by new standard made tires.

The fabric is the life of the tire. By reinforcing the fabric you get many additional miles of service, besides making punctures and blow-outs impossible. K & W Reliners will easily reduce your tire expense 50 per cent.

When placed in an old casing, a K & W practically vulcanizes itself to the inner fabric and covers up all the cracks and worn spots; reinforces the whole tire in exactly the same way that an inside blow-out patch reinforces one weak spot.

The exclusive features found in K & W Reliners are fully covered by patents and cannot be found in any other reliner made. Every K & W Patented Reliner is backed by our positive guarantee of service and satisfaction.

Dandy Reliners.

As there are many instances where a Reliner would do all work required by reinforcing and preventing punctures (and sometimes not necessary to be made of as good material as our K & W Patent Reliners) we have decided to manufacture a reliable, low priced tire-reinforcement and have succeeded so well that "price and quality" will satisfy any one who is satisfied with any other tire protector on the market.

The Dandy Reliner is built wide. It will reinforce the casing at the edges. It is made of from three to five plies of heavy rubber duck. It is neatly made. It will fit the tire perfectly. It is heavily coated with cement—all ready to insert. It is semi-cured and very pliable. You will be well pleased with the Dandy Reliner.

We also manufacture a LIGHT WEIGHT Reliner made of "two" layers. The LIGHT WEIGHT is excellent for a tire that is "Rough Inside."

PRICE LIST.

	Dandy Reliner	Light Weight Reliner
28x2½	\$2.60	\$2.40
28x3	3.10	2.90
30x3	3.40	3.25
32x3	3.60	3.30
28x3½	3.90	3.50
30x3½	4.05	3.60
32x3½	4.30	3.75
34x3½	4.50	3.85
36x3½	4.70	4.00
30x4	4.90	3.60
31x4	5.20	3.80
32x4	5.40	4.00
33x4	5.50	4.20
34x4	5.70	4.30
36x4	5.85	4.40
34x4½	6.30	4.55
36x4½	6.65	4.80
34x5	6.80	4.85
36x5	7.00	5.25

Write for our K & W Tire Accessory Catalog, containing prices of our "Patent" Reliners. See your Dealer—if he does not sell K & W PRODUCTS, write us for a special price.

K & W MANUFACTURING COMPANY

Denver Branch: 1545 Broadway, Denver Colorado

MAIN OFFICE AND FACTORY: 3rd Street, Ashland, Ohio

Please mention the Automobile Dealer and Repairer when writing to advertisers.

HERE IT IS!

It's just the Screw Plate everyone has been waiting for.

Contents:

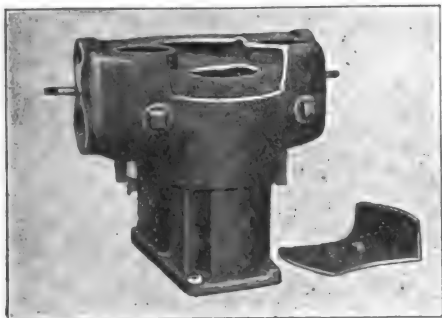
- 1 Plate Stock 11" long.
- 1 each, Screw Adjustable Dies 1/4x28, 3/8x24, 1/2x20.
- 1 each, Plug Hand Taps 1/4x28, 3/8x24, 1/2x20.
- 1 each, Spark Plug Taps 1/2" Pipe and 7/8x18 A. L. A. M.
- 1 Adjustable Tap Wrench, No. 1.
- 1 1/2" Cold Chisel.
- 1 Center Punch.

All for \$6.50, Net.

BUTTERFIELD & CO.

Derby Line, Vt. — and — Rock Island, Que.

New York Store: 126 Chambers St.



When Your Auto Breaks Down

Don't buy a new part. Send the broken part to us—we'll make it as good as new at but a fraction of the cost of a new part.

Illustration is from a photograph of cylinder repaired for the Consolidated Motor Co., of Bridgeport, Conn. We saved the Company \$30.00.

We can weld practically every broken metal part of the car—cylinders, axle housings, crank and transmission cases, etc. Repairs made on all cast metals—iron, steel, brass and aluminum.

No Charge Unless Satisfied

If, within one year after date of repair, part is found unsatisfactory, ship it to us (by freight, collect). Money refunded upon inspection of part.

Write for full particulars of our process

WATERBURY WELDING CO.

1148 C South Main Street

WATERBURY, CONN.

HORSEY

THAT'S THE NAME

ONE
MINUTE
REPAIR



USE
GASOLINE
ONLY

No Cement

No Acid

Inner Tube Patch

One trial of Horsey No Cement Patches and you will consign Cement and Acid Repair methods to the scrap heap and be dollars ahead by doing it.

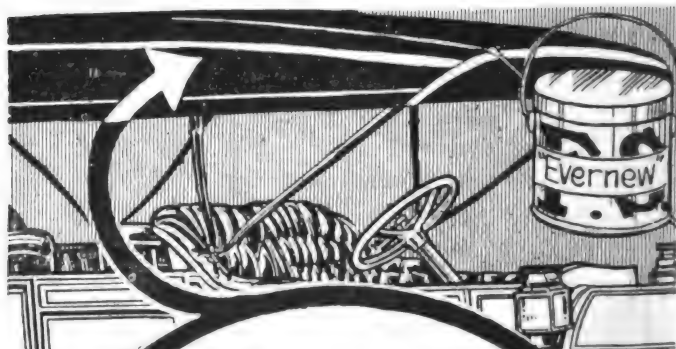
Large Kit, box contains 12 assorted (large and small) patches, \$1.00.

Small Kit, box contains 8 assorted (small) patches, 50 cents.

Manufactured exclusively by

The Horsey Manufacturing Co.

5606 Euclid Ave., Cleveland, O.



Make Your Auto- Top Look Like New—Use Felton-Sibley "EVERNEW" AUTO-TOP DRESSING

IT'S the best way to brighten it. Easily applied with ordinary paint brush in a few minutes. Water-proof, weather-proof, dries quickly, will not crack, can't injure the finest top. A fine-appearing, new-looking auto-top adds wonderfully to any car—"EVERNEW" Auto-Top Dressing will keep yours that way all the time. Comes in 8 standard colors—special shades to order. Send for color card and prices.

FELTON, SIBLEY & CO., Inc.

Mrs. Colors, Paints, Varnishes

136-140 N. Fourth St.

PHILADELPHIA, PA.

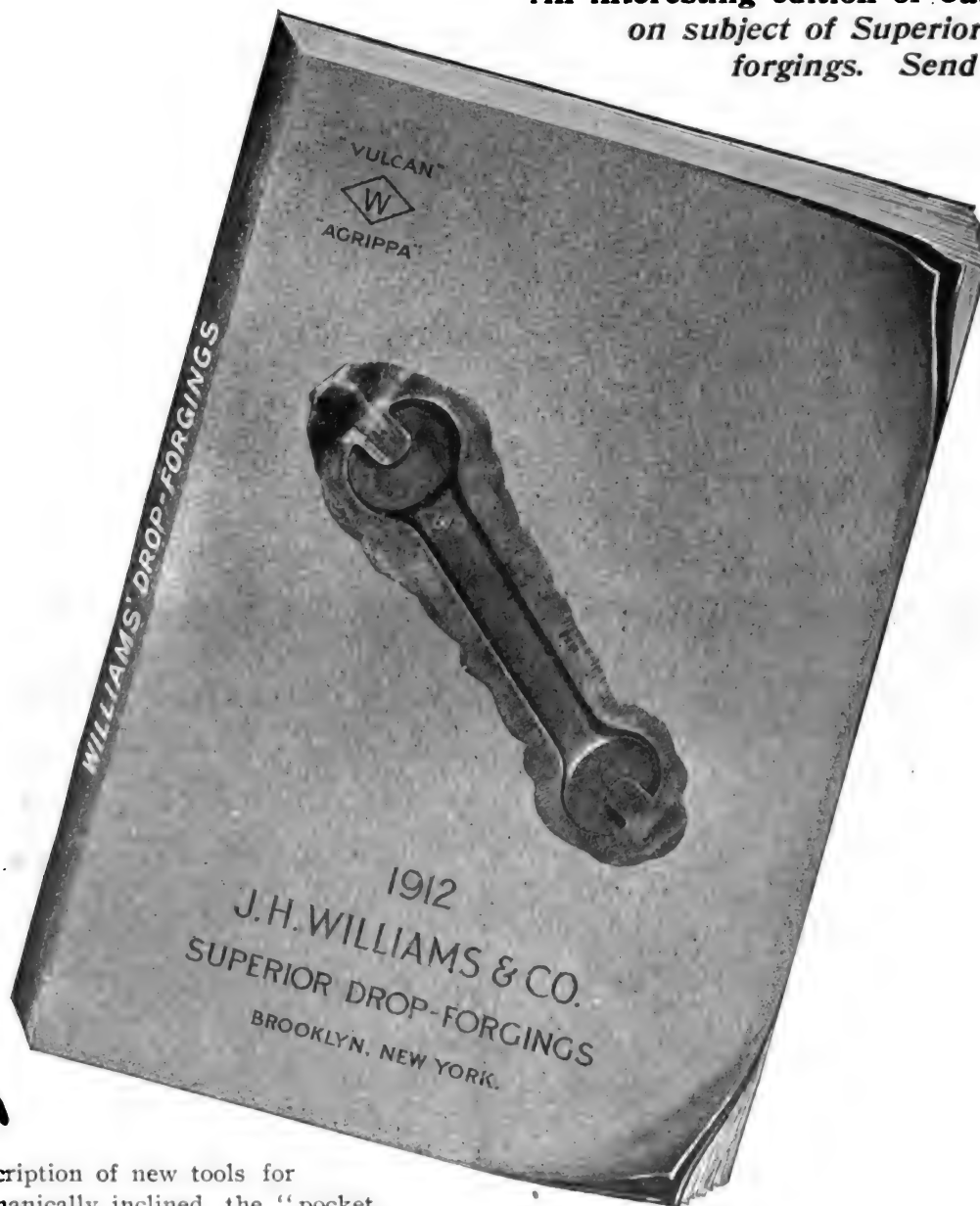
"Evernew" Auto-Top Sizing for first coat on mohair, cloth or canvas tops that have never been painted.

"Evernew" Auto-Body Enamel in colors to correspond with "Evernew" Auto-Top Dressing.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

Just out!

*An interesting edition of Catalogue
on subject of Superior Drop-
forgings. Send for it.*



The description of new tools for the mechanically inclined, the "pocket size" of book and the valuable additions to the stock lines of Heat Treated

**Crank Shafts
Connecting Rods
Valve Stems
Igniter Levers, Etc.**

should alone make it worth your while to write for (free) "Pocket Edition" size of Catalogue.

J. H. WILLIAMS & CO.
Superior Drop-forgings
No. 17 RICHARDS STREET
BROOKLYN, NEW YORK

Please mention the Automobile Dealer and Repairer when writing to advertisers.

MAKE MONEY REPAIRING TIRES

BOLTLESS TIRE KETTLES



CASING REPAIR VULCANIZERS
AIR COMPRESSORS and TANKS
STEAM BOILERS
INSIDE PATCH VULCANIZERS
TUBE REPAIR VULCANIZERS
POT HEATERS and STEAM VULCANIZERS
COIL SPRINGS FOR RETREADING
RETREADING MOLDS
ROTARY RASPS
WIRE BRUSHES, Etc., Etc.

The Boltless, Quick Opening Tire Kettle and other devices shown in our New 1912 Catalogue insure best results from the smallest investment.

With this kettle you can cure a retread as easily as a sectional repair. **There is not a single bolt to tighten.**

Give your customers quick service by curing retreads as fast as they are built up.

You can make money repairing tires either as part of a garage and general repair business or as a separate venture. Requires very little capital to equip a shop completely with the best tire repairing outfit in the world. The equipment can be paid for and a good profit made by the first season's work. Every motorist must have tires repaired—every motorist in your vicinity is a possible customer for tire repairing.

Get the right kind of equipment—one that produces work that you can guarantee—the Akron-Williams Tire Repair Equipment which was designed by practical tire factory repairman.

Localized heat is the secret of the Akron-Williams. Three separate steam chambers in each of our sections, our exclusive patented feature, limit the curing process to the repaired part.

Proof that the Akron-Williams is the best is the fact that the big tire manufacturers use it—Firestone, Goodyear, Diamond, Republic, Pennsylvania, Revere, Hartford, Consolidated, Empire, Manhattan, Shawmut and many other tire manufacturers are among our customers. They know by experience what is most practical. We can equip a tire repairing plant of any desired capacity. Don't delay getting into this profitable business.

Get into correspondence with us to-day.

THE WILLIAMS FOUNDRY & MACHINE CO., Glendale Avenue, Akron, Ohio

Tie this can to your radiator troubles. Then watch 'em go!

SEMENT-OL
"CHEMICALLY CORRECT"

Stops a leak in fifteen minutes. For keeps, too. Finds it and fixes it. Price 75¢. Ask your dealer or write us.

THE NORTHWESTERN CHEMICAL CO.
Marietta, Ohio.

Revolving Cases.

OUR NEW CASE.



Square Drawers, from 2 1/4 x 8 1/4 x 4 1/4 to 5 1/4 x 5 x 13 1/4.

No manufacturer, dealer or repairer of Automobiles should be without our Cases. They occupy but a small space and their capacity is very large. The Drawers are locked in the Case so as to prevent their removal. Every Case guaranteed. Made for Screws, Bolts, and other small articles. Made in various sizes.

Catalog sent on application.

AMERICAN BOLT & SCREW CASE CO.,

Dayton, Ohio.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

WAYMAKER HORN

The best auto horn—and the best advertised

The Waymaker Horn has proved its case.

Dealers who handle it report exceptional sales—their repeat orders led us to spread our advertising largely, starting with June.

Through *The Saturday Evening Post* alone we are reaching two million circulation—or ten million readers, at the accepted average of 5 readers per copy.

Through *Cosmopolitan*, *Everybody's*, *McClure's*, *Review of Reviews*, *Collier's Weekly*,

Life, *The Literary Digest*, *Hearst's Magazine*, *American Motorist*, *Motor Car*, *Motor Print*, *Auto Trade Journal*, *Motor*, *The Automobile*, *Motor World* and *The Horseless Age*, we are reaching over three million, four hundred thousand additional circulation (or another 17 million readers, if you want complete figures).

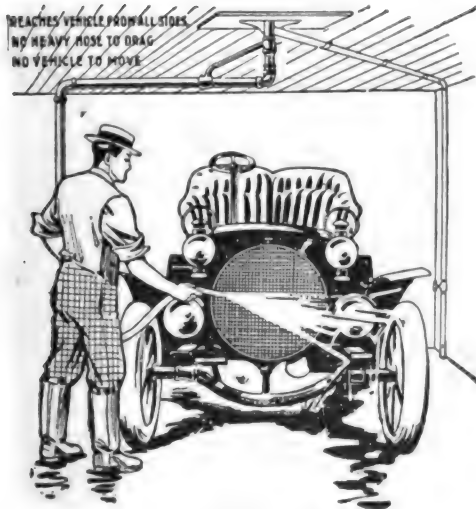
Never before has an auto horn been so well advertised—reaching practically every car owner direct and through all his friends.

This means orders—for you

If you want them, stock up at once on the **Waymaker Horn**. Write to-day for our trade proposition, our descriptive booklet I, and the **Waymaker Data Book**, showing how our simple coupling system enables you to fit any car from a minimum stock of couplings.

LEE TIRE & RUBBER CO. CONSHOHOCKEN, PA.
J. ELLWOOD LEE, Pres.

The Western Buggy Washer



IN OPERATION

It saves time, labor and money. It keeps the hose off the floor.
It drains both ways. It is made of malleable and wrought iron.
It is sold on honor and guaranteed.

THEREFORE, your hose keeps dry and never wears out. No kinks.
No freezing. No breaks. Works easily and smoothly.

SPECIAL SALE Price \$8.00

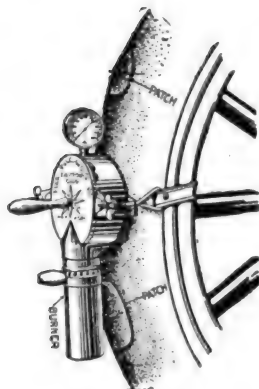
We will ship you one of our Overhead Washers on 30 days trial, if not satisfactory to be returned at our expense.
Manufactured under our own patents and guaranteed by us.

The Western Robe Mills

24-26 PECK COURT

CHICAGO, ILL.

Direct from Factory to You.
We Save You the Middleman's Profits.



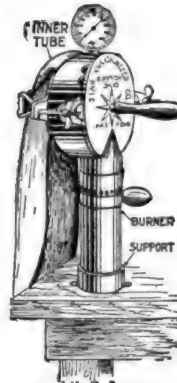
30,000 Vulcanizers Now in Use

Don't Worry—Send for a

Star Vulcanizer

It is the small cuts that cause the trouble—into which the sand and foreign matter works—between the rubber and the canvas fibre layers that

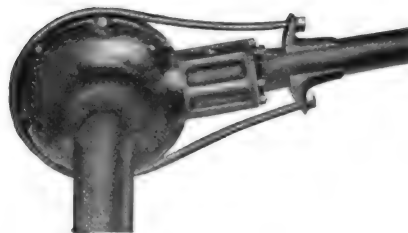
cause the big holes, blisters and blowouts. This can all be avoided by using a **Star Vulcanizer**. If the average autoist were to examine his tires once a week and vulcanize the small cuts, the tire trouble would be a thing of the past. You vulcanize the casing right on the wheel and the inner tube as you see it in the cut.



COMPLETE CASH WITH
OUTFIT AT \$6 ORDER

The Star Vulcanizer Mfg. Co.
276 North High St., Columbus, Ohio

The Gardner Patented Rear Axle Truss



WILL STRENGTHEN YOUR FORD "T" REAR AXLE 500 PER CENT

Stops that chattering and vibration.

Keeps the grease in and the dirt out.

Can be installed on car in three minutes.

Short truss for 1910 cars with babbitt bearings.

Long truss for 1911 cars with roller bearings.

Special long truss for 1912 cars.

All sizes for \$3.00 each
F. O. B. Chicago

Write for scheme for getting pistons out of FORD engine without taking engine from car

GARDNER ENGINE STARTER CO.

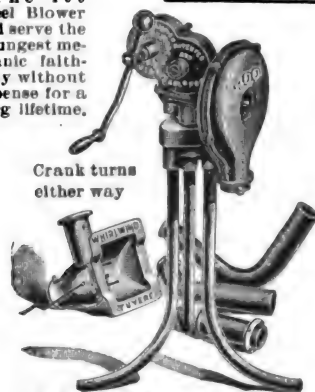
1451-1453-1455 Michigan Avenue

Chicago, Ill.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

The Incomparable 400 Blower, the one greatest Helium that will be handed down from one Generation to the other. Ask what the owners say.

The 400 Steel Blower will serve the youngest mechanic faithfully without expense for a long lifetime.



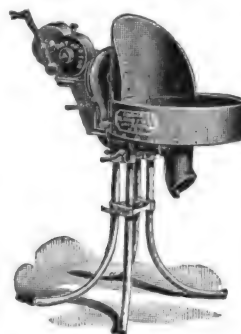
Crank turns either way

The Famous 400 Champion Steel Blower



No. 408 Steel Blacksmiths' Forge

Over one-half million 400 Champion Steel Blowers and Steel Forges in use. Forever run easy, smooth and noiseless.

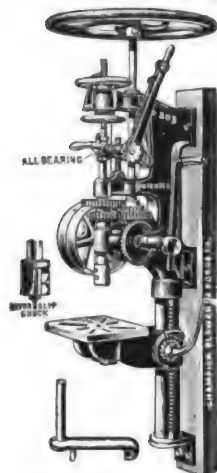


No. 401 Steel Rivet Forge

20-inch Double Back Geared Upright Power Drill is furnished with three complete feeds and is suitably adapted for machine shop and garage use. If you are in need of a power or hand driven Drill write us for full information concerning our complete line.



20-inch Drill

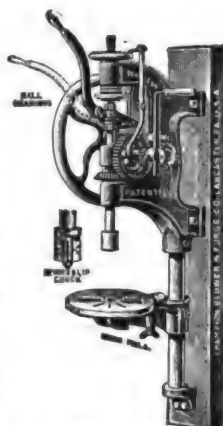


No. 203 Self-Feed and Double Compound Lever-Feed Drill

Champion "Patented" Automatic Self-Feed and Lever-Feed Upright Post Drills.

Made with Ball Bearings only. With the Lever or Automatic Self-Feed 95 per cent in Time and Labor is saved by the instantaneous raising of the Drill Bit out of the hole just bored and again replacing the drill bit back on the material ready to bore the next hole. Remember—There is NO TURNING BACK of the Screw NUT with EITHER FEED.

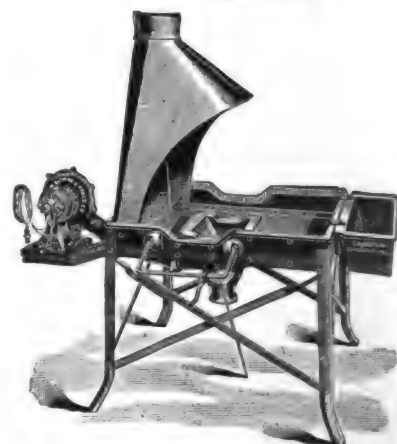
All the Leading Dealers Carry a Stock of CHAMPION GOODS.



No. 200 Lever-Feed Drill

Before purchasing a Hand Blower, Forge, Drill Press, Tire Bender, Tire Shrinker, Screw Plate, Power Blower or Electric Blower, write for our free catalogue, which always shows the greatest variety of improved blacksmith tools built under one control in the world.

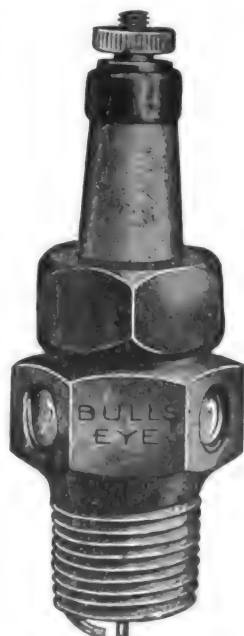
THE CHAMPION BLOWER & FORGE CO.,
LANCASTER, PA.,
U. S. A.



No. 440 Electric Forge

BULLS EYE SPARK PLUG

"The Plug with the Crystal Ports"



Shows at a glance dead cylinders and imperfect combustion.

Aside from special features the best made spark plug on the market.

Ports guaranteed against breakage.

Order a set from your dealer or from us. \$1.25 each, charges prepaid on receipt of price.

G. C. BLICKENS DERFER CO.
STAMFORD, CONN.

Our New No. 8 Adjustable Sectional Vulcanizer With Three Cavities



As a Progressive Business Man you should by all means use, handle or recommend our

New Improved Auto-Tire VULCANIZING MACHINE

simply and solely because it is the best there is in Vulcanizers at any price and because the price isn't much, the operation is easy and profits are exceptionally large.

Our machine is different, far better and more economical in operation and investment cost than any other made. In all features it is superior to all other devices there is hardly a comparison. We have some facts that will interest you and that will put you in the way of big profits. In your own interest, get posted—Write to us to-day.

Auto-Tire Vulcanizing Co., Lowell, Mass.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

TRUCK OWNERS, ATTENTION !

We have purchased a job in First Grade Truck Tires and are selling them as per the following list.

Here is a great chance to reduce your maintenance cost.

KELLY-SPRINGFIELD ENDLESS TIRES

13 32 x 3 1/2	regular price \$59.50	Our Price \$16.00
70 32 x 4	" " 71.25	" " 22.00
53 34 x 4	" " 80.50	" " 25.00

FIRESTONE ENDLESS

16 32 x 3 1/2	regular price \$59.50	Our Price \$16.00
1 31 x 3 1/2	" " 55.00	" " 18.00

GOODYEAR ENDLESS

1 32 x 3 1/2	regular price \$59.50	Our Price \$16.00
4 32 x 4	" " 71.25	" " 22.00
4 36 x 3	" " 67.00	" " 20.00
2 34 x 2	" " 35.00	" " 12.00

KELLY-SPRINGFIELD BLOCKS

400 4"	regular price \$4.25	Our Price \$2.00
126 5"	" " 7.25	" " 3.40

SPECIAL PRICES FOR QUANTITY

TIMES SQUARE AUTOMOBILE CO.

1708 to 1718 BROADWAY, NEW YORK CITY

N. E. Cor. 54th St.

Tel. Columbus 7266

HAVE A SIGNAL THAT ACCORDS WITH ALL THE REQUIREMENTS OF THE LAW

Jericho ONE TONE **Horn**
Jubilee CHIME TONE **Horn**

POPULAR WITH PUBLIC

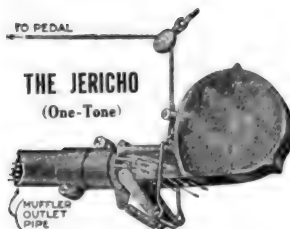
Because

It gives timely, courteous, effective warning.
It is not harsh, discourteous or offensive.

POPULAR WITH MOTORISTS

Because

It prevents accidents.
It meets all requirements of city ordinances.
It costs little to install and nothing to maintain.
It is always dependable—never clogs or balks.



Any Motor Car Agency, accessory dealer or garage will equip your car with Jericho or Jubilee - and the bill will be less than \$10.

If your dealer cannot supply you, write for our free BOOKLET D about Jericho and Jubilee and other auto accessories.

THE RANDALL-FAICHNEY COMPANY,

BOSTON, MASS.



Diamond SEAL-TITE

Gives the Dealer Two Profits

- 1st. A direct profit on every can sold.
- 2nd. An indirect profit because it satisfies your customers and brings them into your store to buy other accessories of the same high quality.

SEAL-TITE is a putty-like gum that is kneaded into a cut after the cement has been applied. Repairs both casings and tubes.

SEAL-TITE and cement are packed in separate cans which fit into a combination can—see illustration.

SEAL-TITE is being advertised extensively. We can furnish you with attractive Seal-Tite folders for distribution among your trade.

We want you to cash in on this advertising by putting Seal-Tite in stock.

THE DIAMOND RUBBER CO. of N. Y., Akron, O.

Subsidiary of the B. F. Goodrich Co.

Another Step Forward

IN BRAKE EFFICIENCY



"The Brake Lining of Quality"

The efficiency of your automobile brake is measured by the quality of the brake lining.

The adoption of *Multibestos* by many of America's leading pleasure car and truck manufacturers is ample proof of *Multibestos* quality, efficiency, durability and economy. It is superior because of the firm, closely woven asbestos fabric, and the special treating processes.

Multibestos is unfailing and guarantees perfect brake action under all conditions of service.

WRITE FOR BOOK

"Safe Within the Grip of *Multibestos*."

Standard Woven Fabric Company
Factory, Worcester, Mass.

Chicago, 1430 Michigan Blvd.
Detroit, 1598 Woodward Ave.
Buffalo, 720 Main St.
Boston, 903 Boylston St.

Philadelphia, 1416 Vine St.
Troy, N. Y., 422 River St.
St. Louis, Capen Betting & Rubber Co.
San Francisco, Fred Ward & Sons
New York, 237 Lafayette St.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

More Power and Speed with Less Gasoline

The M. & M. ECONOMIZER

Is Made for Getting More Power and Speed with Less Gasoline.

THE M. & M. IS FOR

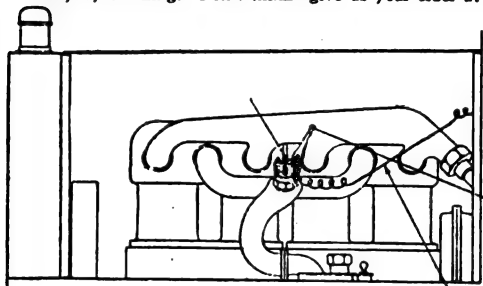
Cooling your Engine
Lubricating the Cylinders
Saving about 40% to 50% of Gasoline
Saving the Brakes
Prolonging the Life of the Batteries
Saving your CLUTCH and Gears
Giving you Control over your Car
Safety Valve in case of back-firing
Saving the Electric current
Making hill climbing easy
Making crowded Streets and rough roads easy



The M. & M. is made with two valves, one for speeding and power with less gasoline, and one valve for coasting.

The M. & M. Economizer goes on the intake pipe and operated by foot pedal, uses no gasoline whatever going down grades. What the coaster brake is to a bicycle the M. & M. is to the automobile.

No automobile is complete without it. By the use of the M. & M. Economizer accidents can be avoided, and your car under absolute control at all times. Simple to attach. Any garage or machine shop can install it on short notice. Act at once. Remember, While you are thinking about giving us your order for one of these M. & M. Economizers you are losing money by thinking. Don't think—give us your order at once.



Patented in
United States
and Europe

**Price
Complete**

\$3.50

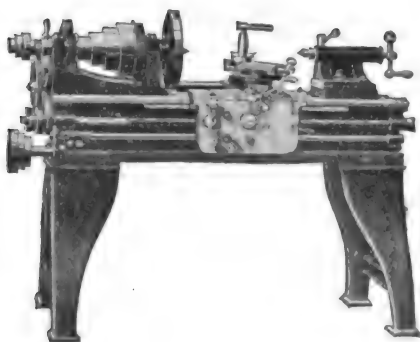
**Agents
Wanted**

Money refunded
if the M. & M.
will not do
all we claim.

The above cut shows M and M all ready attached

Moller Brothers Controller & Economizer Co.
700 Betz Building
Philadelphia, Pa.

SEBASTIAN 15-INCH LATHE



*The LOW-PRICE, PERFECT-QUALITY lathe for
the GARAGE and GENERAL REPAIR SHOP.*

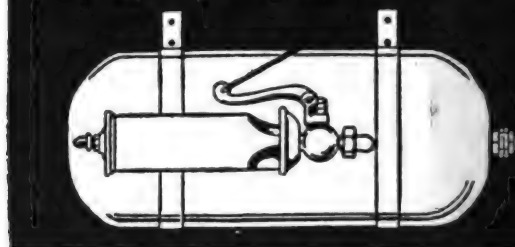
If you are in the market for a lathe be sure and
investigate the merits of the SEBASTIAN.

CATALOG mailed free on request

THE SEBASTIAN LATHE CO.

108-110 Culvert Street, Cincinnati, Ohio

A Real Signal



A new signal for Automobiles, but an old signal in service, the WATRES Power Whistle gives a powerful, compelling blast that cannot be ignored.

The ears of mankind are trained to take warning from a whistle. No other signal can have the same instant effect.

Among a multitude of new devices the power-whistle rings alone with its simple voice of command. Moreover, a whistle blown by stored pressure has from its very nature greater penetrating power than sound produced in any other way.

The WATRES Power Whistle is operated by burned gas from the engine stored in a small reservoir to which the whistle is connected. A touch of the foot pedal operates the whistle and the blast echoes a mile ahead.

Operated by stored power, the WATRES signal is always available. Coasting down hill or around corners or even with car stopped, the power is there—ready for a touch on the pedal.

With the WATRES Whistle goes an accumulator valve which screws into the pet cock opening of one cylinder; the reservoir, 7"x20", copper plated; a four-tone chime whistle, foot pedal and 6 ft. of flexible copper tubing.

We sell the WATRES whistle on a definite guarantee—satisfaction or money back after thirty days' trial.

*Send at once for Booklet giving full particulars
and price.*

WATRES MANUFACTURING CO.

383 4th Ave., New York

We also make above equipment for motor boats. Send for special booklet.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

UNIVERSAL TIRE PROTECTORS



not only save your tires from the wear and tear of road contact, making new casings last indefinitely and giving renewed life to old casings, but they are superior mud and sand creepers. With your tires equipped with "UNIVERSAL" tire protectors you can go and come when you please regardless of road conditions and be certain of getting back safe and sound. No need for extra tires—no delays or annoyance and expense on account of tire trouble. The saving effected through the use of "UNIVERSAL" tire protec-

tors will ordinarily more than pay for your gasoline and the general running expense of your car from season to season. They fit any and all makes of tires, and are as easy to install or remove as quick detachable tires. Special offer to users in unoccupied territory.

Write us today for price lists and discounts.

UNIVERSAL REPAIR BOOTS

are made in three types, the Ratchet Anchor, as shown in cut,

Armored Clincher, and Plain or Unarmored Clincher. All types made in 9 in., 12 in., 15 in. and 18 in.

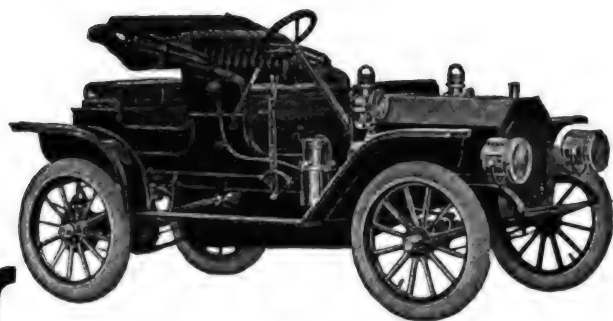
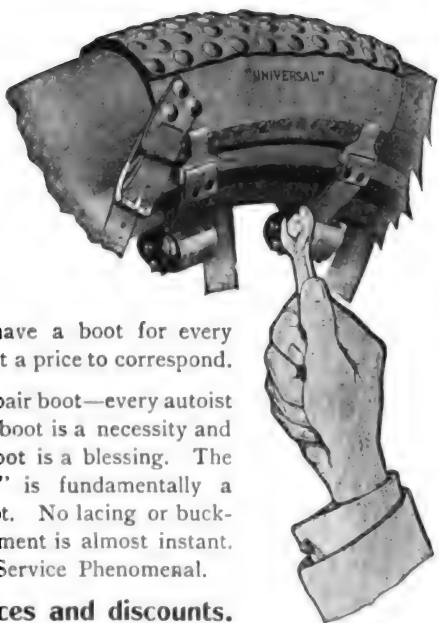
lengths. We have a boot for every emergency and at a price to correspond.

You need a repair boot—every autoist does. A repair boot is a necessity and a quick-repair boot is a blessing. The "UNIVERSAL" is fundamentally a quick-repair boot. No lacing or buckling. Its adjustment is almost instant. Cost Nominal. Service Phenomenal.

Write for prices and discounts.

Universal Tire Protector Co.

Lock Box, 678 D
ANGOLA, INDIANA, U. S. A.



A Free Book for Auto Repair Men

The Auto Repairers' Guide & Price Maker is issued in the interest of automobile repairers, dealers and garage men—it's free to the trade and sent to them only.

Think of it, 480 pages of bargains—about 3000 illustrations—a complete auto repairers' guide and price maker—quotes lowest wholesale prices on first quality automobile supplies, auto repairers' tools, tool kits, spark plugs, horns, lamps, pumps, springs, forgings, brass fittings, batteries, coils, switches, auto tops and in fact everything used on an auto.

Write for your copy today, sending business card, letter-head or some other evidence that you are in the trade.

CRAY BROTHERS

JOBBERS AND MANUFACTURERS OF AUTO ACCESSORIES
1119-1123 W. 11th St., Cleveland, Ohio

Golden Star Auto Body Polish Keeps Your Car Well Groomed

It cleans, polishes and protects the finish.

Does not leave a greasy surface.

Easy and convenient to use.

A few drops of Golden Star Polish used on the dust cloth and your car looks bright, clean and new.

Free Sample

Let us prove (without cost to you) the merits of Golden Star, "The World's Best Cleaner and Polisher." Ask your dealer for a free sample or write us and it will be sent you at once.

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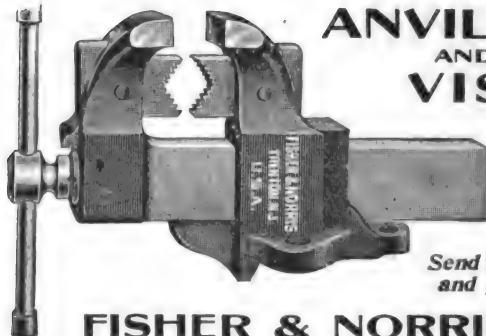
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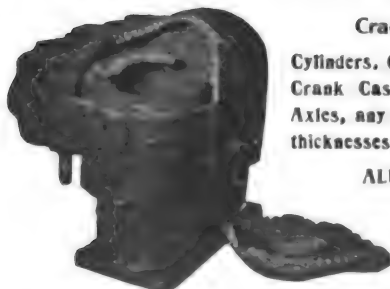


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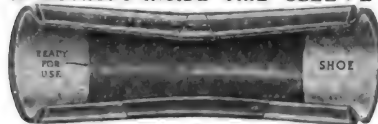
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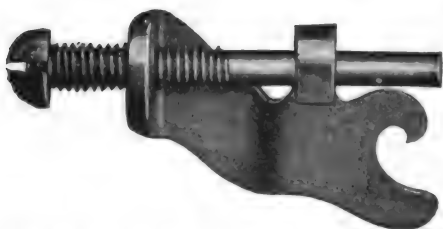
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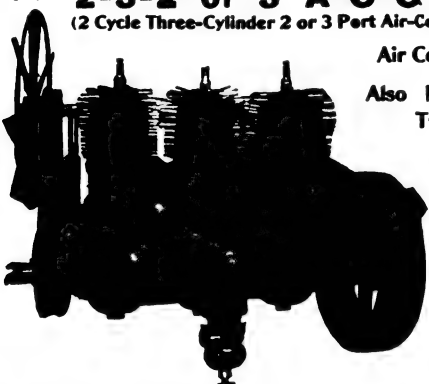
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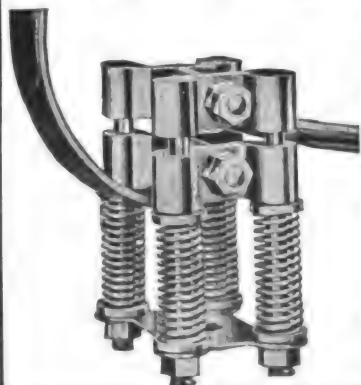
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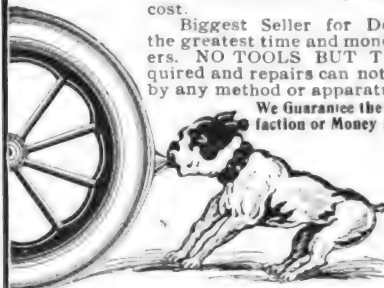
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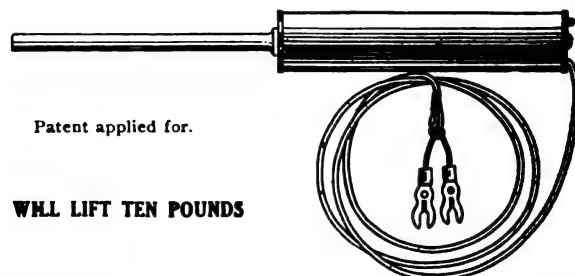


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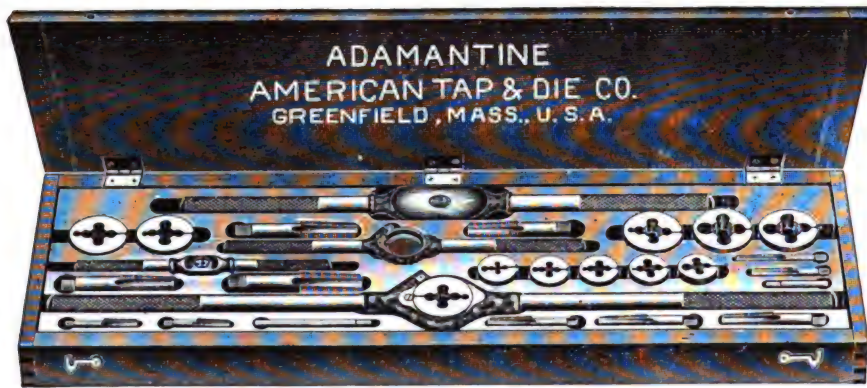
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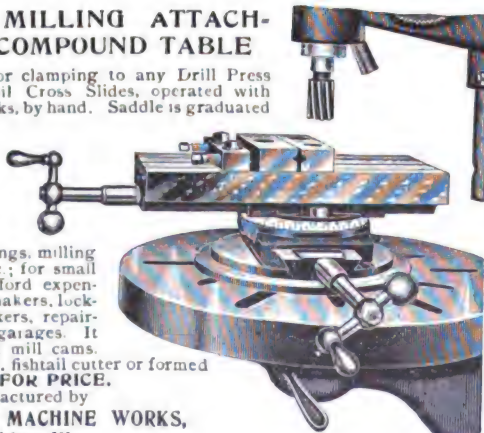
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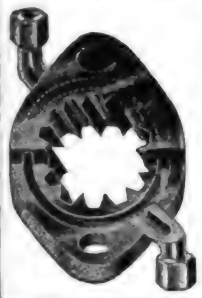
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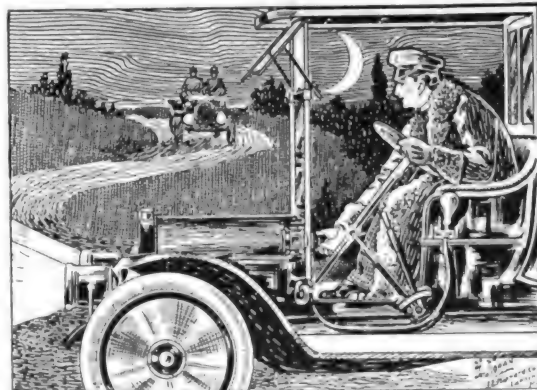


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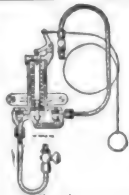
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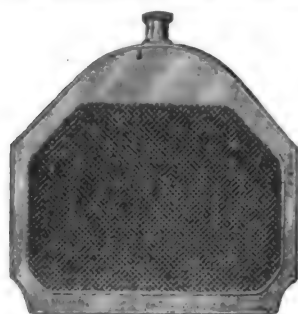
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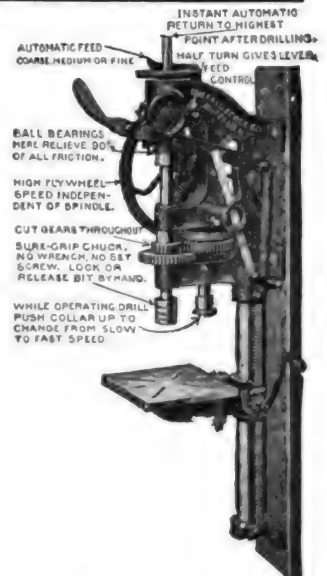
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TROUBLE IN ONE CYLINDER.

How It Was Cured and How One Man Uses an Air Compressor.

BY JAMES F. HOBART, M. E.

A friend of the writer—an engineer of considerable experience in the design, construction and operation of automobiles and other machinery—constructed after designs of his own make, a six-cylinder automobile for himself and family, the design embodying many ideas of his own, and including the best practice of automobile builders. The result fully justified the expectations of the friend and the car is about all that can be desired by any one who wishes an automobile for all around use.

It is nearly two years since the car was built and it has been in commission nearly ever since. The builder has a little machine shop in the back yard of his residence, adjacent to the garage which at present contains two cars, the "six" above noted, and a four-cylinder runabout which is in almost constant use by various members of the family.

The little machine shop contains a couple of stationary gasoline engines, one for driving the two lathes, drill-press, forge blower and emery grinder with which the shop is equipped; the other engine is attached to an air compressor which maintains an abundant supply of air for tire-filling; and this compressor is also made to serve another purpose which much interests the women folk of the family. By means of suitable stop valves, located in the shop adjacent to the engine, the air compressor is at will cut off from the compressed air receiving tank and connected to another tank in the cellar of the residence.

This second tank, which is nothing more or less than a 40 gallon rum barrel, is the receiver for a permanent vacuum cleaning system which is piped throughout the house of nine rooms. Thus the air compressor in the shop is made, by the turning of a couple of valves, to change from an air compressor into an exhaustor and maintains a sufficient vacuum in the barrel for all the cleaning that can be done with two or three suction tips working at the same time.

The receiving barrel in the cellar of the residence is connected with the sewer, and is partially filled with water. All dust collected by the cleaning tips is drawn through the water in the barrel, therefore little if any dust ever gets into the air compressor in the shop. Another little "kink" proves quite convenient, as well as valuable, to wit: A suction pipe is run back into the shop from the barrel in the house cellar, and a suction tip is attached in the shop, where it is found mighty handy for many cleaning operations, not the least of which is that of "doing" the cushions, curtains and other inside "fixings" of the car. A decided innovation in vacuum cleaning is the attaching of a long flat brush instead of the usual collecting tip. The brush has openings between the rows of bristles, and these openings are connected to the vacuum barrel. The result is a

dustless brush, and it is a mighty handy thing, I assure you. Dirt, dried mud, etc., may be loosened up by light use of the brush, and, instead of flying all over everything as when a common brush is used, the loosened dust goes "right up the flue" and that's the last of it.

Incidentally, the enamel of the car is preserved by the use of the vacuum brush. Ordinarily, a brush is a mighty poor thing to apply to dry mud dirt-caked surfaces, for the reason that the dirt loosened by the brush is rubbed around upon the surface of the varnish or enamel, actually grinding away the surface thereof. Evidently no automobile varnish can retain a finished surface very long while being scoured with sand and road-dirt.

But with the pneumatic brush, things are entirely different. It is evident that the brush cannot harm the enamel as long as there is no sand between the brush and said enamel. It is also evident that the brush can-

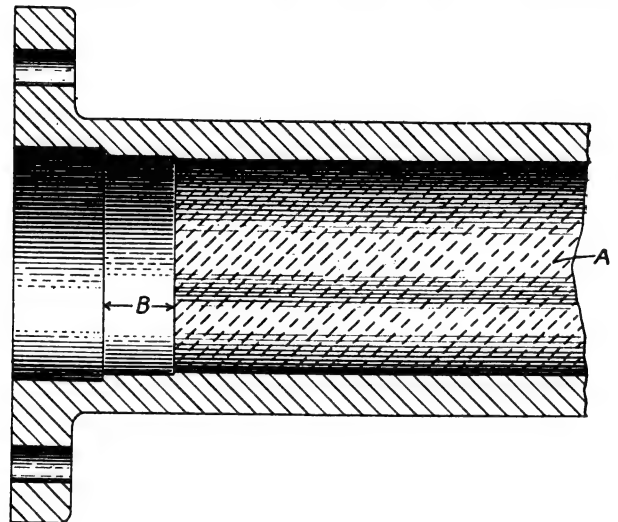


Fig. 1.—Appearance of the Inside of the Cylinder.

not injure the enamel while working upon the outside of a mass of caked-on dirt, because the brush cannot touch the enamel as long as it is scrubbing upon the dirt!

Also, when the dirt is removed just as fast as loosened, how is the brush-rubbing going to injure the enamel surface of the car? And dry cleaning the car has been found a mighty convenient way by the gentleman in question. The condition of the enamel upon the two cars in his garage proves beyond a doubt that vacuum dry brush cleaning is O. K. between wash periods.

The six-cylinder car referred to above, developed a few peculiarities, as all cars will, and one of the peculiar things, and one which gave the owner much concern, was the behavior of one of the cylinders—the second from the front end of the six. Each cylinder in this engine was cast separate from any of its companion cylinders.

"I do not believe in double or triple cylinders," re-

marked the owner of the car, "because in case of trouble with one cylinder, I must throw away two or three. And in case of having to procure a new cylinder to take the place of a damaged one, why, with cylinders cast two or three together, my car is out of commission for a month, while I am getting new cylinders from the manufacturer. To be sure, the maker of the car will replace, free of cost, any defective cylinders, but you have to send in the defective parts, wait for them to be received, a verdict rendered, and new parts to be sent out. All this time your car is out of commission. No, sir! Singly cast cylinders for me, all the time. Why, in the case of my car, I am going to take out that cylinder which troubles me. I will just block off the flange after the cylinder has been removed and I can run the car with five cylinders while I am finding out and curing the trouble in the sixth cylinder. You never will convince me that cylinders should be cast two or three together!"

With five cylinders working nicely, the sixth cylinder of this car developed an irregularity in its action which the owner was entirely unable to account for. Test after test was made for every possible cause of poor behavior without revealing the cause of the trouble. One of the sons of the automobile owner would get out on the foot board while under way, and open one pet-cock after another, thus testing the compression by listening to the sound of escaping gas through the pet-cocks while explosions were on in each cylinder.

It seemed to the observer that he could detect a slight hissing noise in the cylinder which gave trouble. The sound of the exhaust would at times exhibit no irregularity; again, at other times, it would appear quite weak from the one cylinder, changing again to a square exhaust, without a thing being done to the engine.

The owner was positively sure that the ignition and the mixture were all that either should be. A high tension magneto, properly connected and well timed, gave perfect ignition in five of the cylinders and the car was usually started with the magneto in circuit, a quarter turn of the crank ordinarily being sufficient to start the engine.

The spark plug was removed from the weak cylinder and replaced by a plug from one of the other cylinders which had been working well. This did no good. The lame cylinder was removed from the engine and examined closely for leaks with the idea that a small blow-hole might have opened in the wall of the cylinder. But not the slightest defect was found. The lower end of the cylinder was tightly closed, the cylinder placed on end and filled with gasoline and not the slightest trace of leakage could be found. And if there is much of a hole in a cylinder, rest assured that gasoline will find that hole, when the above noted test is made. Any hole which gasoline won't sneak through while under pressure due to a few inches head of that fluid—well, such a hole would have more room on the point of a cambric needle than would a hog in Lake Erie! And that's some room, too! Seemingly, the inside of the cylinder was all right, the rings apparently were well fitting, and the owner of the car put the matter thus:

"Hobart, I have built several automobiles, designed automobiles and auto trucks which are doing good service every day, but I'm beginning to believe that I don't know a thing about automobiles after all!"

That cylinder trouble sure proved a "sticker" to the writer as well as to the owner. The gasoline test was made to prove or disprove a theory advanced by the writer that the trouble was caused by loss of compression through a recently developed blow-hole, but the gasoline test overthrew utterly the blow-hole theory.

The writer has known of instances where leakage developed in cylinders after two years of use without a sign of a leak, and then they suddenly went bad. It was found that blow-holes in the iron were broken through by heavy explosions, causing the leakage to suddenly appear. But there were no blow-holes in this cylinder and the trouble bird continued to ride in the car every time it went out. Finally the owner became desperate, yanked out the defective cylinder, connected up the car to run with five cylinders, and took the weak cylinder into the shop, locked the door and set out to fix that cylinder or—"bust."

The cylinder was "chucked" by being bolted to the face plate of the largest lathe, and trued by the counter-bore. As the cylinder was revolving slowly in the lathe, with an incandescent lamp suspended just beyond the far end of the cylinder, the owner chanced to glance through the cylinder and the light falling at a certain angle, the cause of the trouble stood revealed!

The cylinder presented the appearance of the portion shown at A, Fig. 1, and as it revolved slowly, there

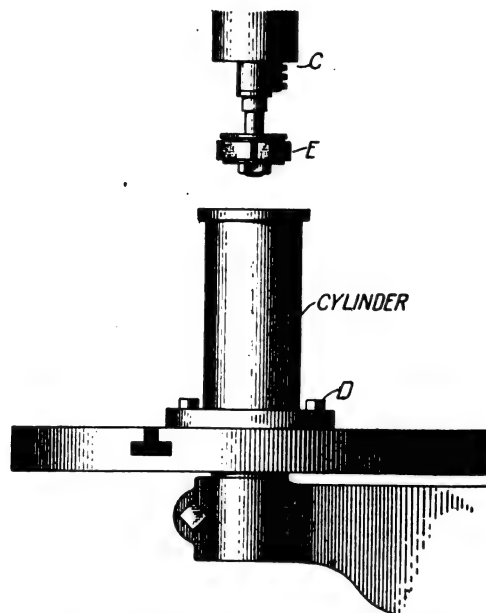


Fig. 2.—Lapping a Cylinder in a Drill Press.

seemed to be a sort of rifling in the cylinder, similar to that in a gun, only not as sharp or as deep, and the rifle marks did not seem to be continuous. Instead, they seemed to pass diagonally, in a disconnected way, through the cylinder. The cause of the trouble was apparent at once, and the owner then recollected that when the cylinders were bored, he had the job done at a local machine shop and that the machinist had trouble in this cylinder, caused by the reamer chattering! And the "chatter marks" are what appear at A. With the inside of the cylinder covered with marks of this kind, it is not to be wondered at, that leakage occurred between cylinder and piston.

The remedy at once suggested itself, and, without removing the cylinder from the face plate of the lathe, the owner set to work to correct the trouble. A cut was started through the cylinder—a very light cut indeed—just enough to go below the chatter marks. The beginning of this cut is shown at B, and it increases the diameter of the cylinder very slightly. It was hoped that the old piston could be made to do duty after re-boring the cylinder—new rings to be made of course, but after completing the boring of the cylinder, the owner determined to leave no possible loop-hole for

trouble, but made a new piston of a slightly greater diameter than the old one.

It had been the intention of the owner to lap the inside of the cylinder after boring it out, and to lap in the lathe without removing the cylinder from the face plate. But the making of a new piston as well as new rings called for the use of the lathe, therefore it was determined to lap out the cylinder in the drill-press, the shop affording a most excellent tool of this kind.

Accordingly, the cylinder was chucked upon the table of the drill-press as shown by Fig. 2, a well fitting bar having been placed in the drill spindle as shown at C, and trued carefully. Then the cylinder was trued with the bar which was made to run exact at either end of the cylinder. As may be seen in the engraving, the cylinder was simply bolted to the table of the press, the make of the cylinder permitting this method of chucking. Had this way been found impossible, a special connecting plate would have been made, which could be fastened to both cylinder and drill-press table.

The lap, E, which was built upon the lower end of the bar in the drill-press, was then brought down into the cylinder, charged with pulverized glass and water and fed slowly and evenly through the cylinder from one end to the other and back again, taking care never to stop the lap in the cylinder or to let it run on an instant without being given an even lateral movement.

In this manner, the tool marks were ground away so perfectly that it was impossible to find one in the entire length of the cylinder. As stated, pulverized glass was used, that substance being far preferable to emery for lapping purposes. Emery once applied to an iron or steel surface, is very hard indeed to remove from that surface. In case of moving parts, the emery seems to remain imbedded in the metal and to cut and grind the bearing or other portion of the machine over which the emery-laden metal may pass. But with glass sand, the matter is different. This material seems to grind to pieces and readily wash out of a bearing, particularly when the lapping is done with water instead of oil to hold the abrading material in place during its use in the cylinder.

The lap shown at E, Fig. 2, is illustrated more fully by Fig. 3, and the details there given should enable any mechanic to make one of these simple tools which will be found of great service when cylinders are rough and need a slight cleaning out.

The lap is shown fully assembled at A, Fig. 3, and it closely resembles a piston with one ring. The bar is shown in detail at B, the length of the bar preferably being made as long as the drill press will accommodate. When this is done, the lap may be used for a short piece of work or for a cylinder as long as can be placed in the drilling machine. If desired, the bar may be extended beyond the threaded portion and the extension being fitted into a tight collar in the press table, the lap will be guided both top and bottom as is the case with a boring bar. But the simple lap as shown at A, will usually answer all purposes.

Next, two or three pieces of hard wood are joined into a circle and turned in the lathe to the shape shown at C. A shoulder is turned in one side of each piece, as shown at H, to receive the flange G, which has been left upon the fixed flange at B. This flange and groove in the wood prevent the segments C, from coming out of the flanges while outside the cylinder. These grooves may be dispensed with, but they are a great convenience. Some pins are shown at J, projecting from the fixed flange. These pins are for preventing the wooden laps from turning around while the bar is revolving.

Look at segments C again and a small hole will be

found at I. This hole and its purpose may be more easily understood after looking at the enlarged segment shown at F, where a helical spring is shown, protruding from the hole in the segment. It is the purpose of this spring—and of the others in the other segments, to provide a steady outward pressure of the segments against the cylinder. Obviously these springs may be dispensed with and centrifugal force relied upon to give the required pressure between lap and cylinder. In this case, the pressure will be regulated by the speed at which the lap revolves.

But the writer much prefers the spring method of regulating the pressure. With springs of equal length, and holes in the segments of equal depth, the pressure will be the same upon each segment—something not

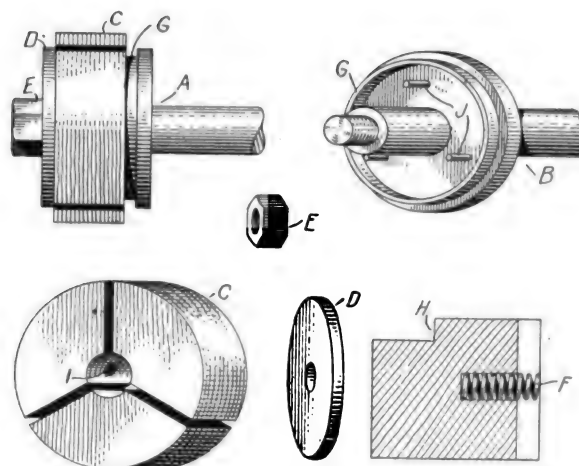


Fig. 3.—Details of Lapping Tool.

to be sure of when centrifugal force is used to throw out the segments against the cylinder walls.

For a cheap tool, the lap above described has no equal, and it is capable of doing the highest grade of work. A tool costing \$1,000 can do no better work than this \$5 home-made lap.

Tuning Up the Engine.

In the process of tuning up an engine on a motor car some curious defects are discovered which at first sight seem to be rather perplexing, and in order to assist other motor car engineers it may be worth while mentioning one difficulty which recently occurred on a fair sized car. This was being tuned up after overhauling, and on driving it it was found that the engine seemed to have the necessary amount of power, but it did not seem to be able to use it properly. In looking round the engine to discover any unsuspected cause of the trouble, the mechanic decided to disconnect the exhaust pipe from the muffler, so as to let the exhaust gases have a free passage. On trying the car in this condition it pulled a good deal better, so that the conclusion which was arrived at was that the exhaust pipes and muffler must be choked with soot to some extent. These were then taken down and thoroughly examined, and the assumption was found to be correct, and they were then thoroughly cleaned. The long exhaust pipes were rather more difficult to clean than the muffler so they were taken out of the motor house and a little gasoline was poured down them and lighted, and by this means the pipes were rapidly cleaned out. Great care should be taken when doing this that a blow-back does not occur, or else the operator might be seriously burnt. After fitting up again, the engine was tried and it was found to go a good deal better because the back pressure on the

engine which caused the loss of effective power had been removed.

Another instance which will probably come within the experience of a good many car drivers may be mentioned. On tuning up a car on the road and going up a hill it was found that the engine commenced to knock as if the ignition was too far advanced. On examination, however, it was found that the ignition was correct, and as the cylinders had just previously been taken off and cleaned they were obviously free from carbon deposit that would otherwise have been the possible cause of the knock. On stopping the car, however, and standing with the engine running the smell from the exhaust denoted too rich a mixture and the mechanic in charge altered the level of the gasoline by adjusting the needle valve. This adjustment, however, was hardly sufficient to effect the desired result, so that the mechanic made the hole of the jet a little smaller. Then by trying the car and adjusting the air valve, he managed to get the car to pull splendidly. It would then take hills on the top gear, which before this adjustment required the use of the second gear owing to the heavy knocking of the engine under normal conditions. After cutting down the gasoline in this way the knock was found to be gone. It may be mentioned that although the alteration of the needle valve and jet of the carburetor is a rather difficult matter, it can be done fairly easily if proper care is exercised and the work is done gradually. The great thing is to remember not to make the jet too small to start with.

GENERAL REPAIRS.

Adjustment of Foot Brakes, Water Jacket Leaks, Tires and Their Use.

In common with most other classes of machinery, the work of the repair man in connection with motor car practice can be roughly divided into two main divisions. The first is the original work necessary to produce the car with its engine and accessories, and the second is the work required to maintain the car in good condition during its running. It may be argued with a very good show of reason that of the two branches, probably the more important is the latter, inasmuch as it takes more ingenuity to produce a good repair out of a bad breakdown than it does to originally construct the car with all the advantages of untouched raw material and first-class modern machine shop appliances at the back of the mechanic. Hence one or two notes concerning repairs which may at first sight seem insignificant but which give a fair average example of the daily worries of the motor car mechanic attached to a repairing shop will not be without interest.

Take, for example, such a simple matter as the adjustment of the foot brake. This is a matter which in its effect on the actual running of the car is of the utmost importance, but nevertheless, it will be found that a good many cars are not properly treated in this respect. In many modern cars a thumb screw will be found for adjusting the brake, and by merely giving this a turn or two it is possible to tighten it up. Where these accessories are to be found, there is no excuse whatever if the foot brake is not kept carefully adjusted. One point about the matter is, however, that the foot brake is as a rule made of cast iron with a steel lining and after a lot of wear during the running of the car the steel lining wears away and the old lining has to be taken off and a new one riveted into its place. Moreover, care should be taken in overhauling a car to see whether the brake shoes require bringing up into shape or not. It is

very often found that these are more or less badly distorted after a car has been running for some time, owing to the fact that not only has hard wear taken place, but in every probability the brake will have been applied in a harsh and sudden manner. When the new lining is fitted the wheels should be jacked up and the brake should then be applied to see if it will stop the wheels quickly. A practical test is to see whether the wheels can be moved with all the strength of the mechanic applied when the brake is on. If it is impossible to turn the wheel it is evident that the brake upon it will be sufficient to pull the car up. A conclusive test, however, is to try the car on a road and see how the brake acts on a hill, and this is probably the most practical method of brake testing that can be adopted. When the car is sent out for a run the brake should be well lubricated or greased, or otherwise the action will be a little harsh and when applied it will cause an unpleasant squeaking.

Another typical example of the kind of work which a motor car repair mechanic is called upon to do, is the stopping of slight leakages in water jackets and radiators. These radiator leakages are the cause of considerable trouble when the car is on the road, because should such a leakage occur it can hardly be discerned and the loss of water in the cooling system may be very great should the car have been standing for some hours. It will be found that the honeycomb type of radiator is especially prone to these leakages, as the metal of which it is composed is very thin and there are a good many joints in the construction, and hence it is sometimes hard to find the exact location of the leakage. A piece of apparatus for stopping such leaking, however, until the radiator can be taken down and properly repaired can easily be made and the hint may be worth remembering. It simply consists of two small square plates of steel or iron with two pieces of sheet rubber to act as a packing piece to each of the plates. One plate is fixed to a piece of round steel, say of $\frac{1}{4}$ inch section, while on the other end of the steel a thread is cut and a thumb screw fixed. When the leakage occurs on any portion of the radiator, one end of this bar is threaded through the comb of the radiator, and the rubber plate is fitted on and held tight against the radiator by screwing up the thumb screw. By this means the leakage can be stopped for a time. Leakages on other types of radiators, however, are not quite so easily put right as the only way to really effect the repair is by means of soldering. This is not by any means an easy undertaking because as soon as the solder reaches the metal it cools down and cannot be worked properly on account of the fact that the radiator is a very large mass of metal and consequently it has a large cooling surface. A good practical plan is to carry a small tin full of white lead in the car and if the leakage is not too great the hole can be plastered up for a time with the white lead until it is possible to get the radiator properly attended to in a repair shop.

Leakage of the water jacket will most likely be found to be located at the plug or it may be that the packing is worn away from the top joint which is situated at the top of the cylinder. In some cases, however, it will be found that the leakage is due to a crack in the casting, and in this case the best thing to do is to take the cylinder down and send it to one of the firms who specialize in oxy-acetylene or oxy-hydrogen welding, in order that a good job can be made of it. In some cases car cylinders have been given a second life by means of such welding processes, and they are to be commended to the attention of motor car engineers.

Accidents will happen in most repair shops, a good many of which are due to inattention. For example in

one case it was necessary to fit a new washer to the top of the cylinder of the water jacket. The mechanic in charge of the job had a mate with him who was left to cut the new washer and also to scrape the old one off the cover. The mate said that he had done this properly, and the mechanic took it for granted that this was the case. When tightening up the nuts that held it in position he found that one side would not go down so far as the other and in forcing the nut the stud was of course broken off. This made it necessary to drill out the old stud, which was a 5-16 inch one and to do this a drill 3-16 inch in size was used because where the stud had broken off there was a flaw in the casting. After being drilled a 1/4 inch taper tap was screwed into the hole, and then by carefully handling, a 5-16 inch taper tap was used. It was necessary to proceed with extreme caution in this case as there was only about 3-16 inch of room to spare, and if a large drill and tap had been used at first there is no doubt that the casting would have broken. After tapping in this way, a new stud was fitted and the part of the old washer was scraped off. A new water tight joint was then made with some jointing material, varnished over with gold size and this was found to answer very satisfactorily.

One of the jobs which frequently falls to the lot of the man in the repair shop attached to a garage is the overhaul and inspection of tires and valves attached to them. It is essential in order to prevent trouble through slow leakage in tires to keep the dust-caps of the valve well screwed down or otherwise fine dust gets in and in time finds its way to the rubber seating and prevents the plug or plunger from acting properly and remaining air tight. Should the accident happen of losing the dust-cap on the road, and another is not available, the valve should be tied up with a piece of rag as this is a good plan of preventing dust from entering the valve.

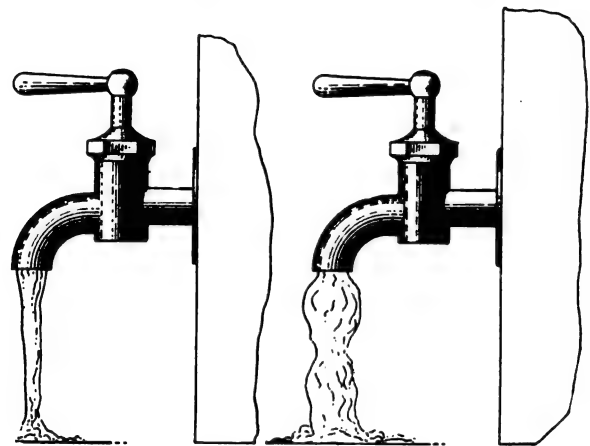
Care should be taken to keep the tires up to the pressure that is specified by the makers and a pressure gauge should be used to keep a uniform pressure. If, however, a pressure gauge is not available, it is possible by rocking the car from side to side to find out with a fair approximation of accuracy if the tires are tight enough. It should be seen whether the tires roll with the swing of the car. If they do they are tight enough, but if not they should be pumped up as soon as possible. It should be remembered that hot summer air acts on the tires and causes the tube to expand, so that a little allowance must be made for this or the tube will burst. The security bolts should be kept well tightened up in order to prevent the tire from creeping and to guard against water from getting in and injuring both the tire and tube. Should there be any bent bolts in the wheel these should be taken out and replaced by good ones as they will probably be the cause of a nip in the air tube. Yet another point is to see that the leather or canvas coverings on the security bolts are intact.

The above points only cover a few of the minor matters which a repair mechanic has to look out for during his day's work. A good many others might be added, but the result of adding them would be to make these notes too long and the above are therefore selected in order to show that a good deal of care and observation is required in order to send out a car from the repair shop in an efficient running condition.

The leather covering or boot of the universal joint and other leather coverings about the underbody of the car should be examined from time to time. Flying stones, or sticks are apt to destroy these coverings, exposing the surface to dust and dirt.

The Weather and Lubrication.

A good carburetor on a motor is essential but it will be of small avail if the mixture is unbalanced between the time that it leaves the carburetor and the instant when it departs from the cylinder on the scavenging stroke. If the gasoline phase of the problem is well cared for the first thing to consider from this point of view is the fact that the mobility of the lubricating oil should be constant. The idea of mobility is illustrated in the illustration, showing two casks heads holding oil, and for the sake of argument let it be assumed that one cask is being run off in January and the other one in July. That the January oil will run slow is a well appreciated fact, and that the July oil will be attenuated follows in view of the difference in temperature. The reason for this performance lies in the lack of mobility of the oil; it thickens up when it gets cold, and it thins down when it is heated up. If lubricating oil has this



How Temperature Acts on Liquids.

property it is lacking in value for cylinder lubricating work. Lubricating oil that has an undue tendency to thin out when it is heated is likely to flash at the high temperature that obtains in a motor cylinder; moreover, in view of the fact that piston rings are rarely ever actually tight, it is but a step to the conclusion that lubricating oil of a constant mobility, if it is initially of the right consistency will serve as a packing for the piston rings and prevent leakage of the combustible from the combustion chamber around the rings into the crank case.

Automobile Exports.

Twenty thousand automobiles will be the export record of the United States in the fiscal year, which ended with the month of June, and their value, including parts and accessories, will approximate \$27,000,000.

This statement is in round terms, for the Bureau of Statistics, upon whose figures the estimate is based, has at present detailed figures covering but ten months. They show, however, nearly 17,000 automobiles exported to foreign countries in the ten months ended with April, valued at \$16,500,000; parts thereof, \$3,250,000, tires, sent separately from machines under the head of exports of rubber manufactures, making \$2,000,000, and automobile engines, \$666,000, making a total for the ten months of practically \$22,000,000, and fully justifying the assertion that for the full twelve months the total will approximate and probably exceed \$27,000,000. This figure includes only the exports to foreign countries and is exclusive of the 900 machines sent to our non-contiguous territory, valued at about \$1,500,000.

This total of \$27,000,000 in automobiles sent out of

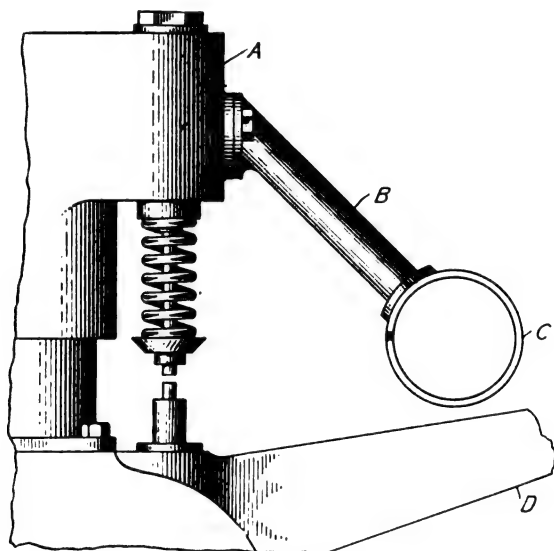
the country in 1912 is in marked contrast with the figures of a decade ago, 1902, which, by the way, was the first year in which the bureau of statistics found the exports of automobiles of sufficient importance to justify a separate record, the total for that year being a little less than \$1,000,000, as against \$27,000,000 ten years later.

The growth in exports of automobiles has been especially marked during the period since 1905, this growth being coincident with the expansion of the domestic industry, and a corresponding decrease in imports of automobiles. In the period from 1899 to 1904 the value of domestic manufacturers increased about \$25,000,000, from \$5,000,000 in 1899 to \$30,000,000 in 1904, an increase of \$25,000,000; while in the period from 1904 to 1909 the value of the output increased practically \$220,000,000, from \$30,000,000 in 1904 to \$249,000,000 in 1909.

Accompanying this notable growth in production, the imports of automobiles decreased from \$4,250,000 in 1906 and \$4,750,000 in 1907 to approximately \$2,500,000 in 1912. While France still leads the world in exports of automobiles, the United States surpasses that and all other countries in rapidity of growth of production and exportation.

Clearing Cylinders of Burnt Gases.

The time available for the removal of the products of combustion after the power stroke in the motor is too short to permit of complete scavenging. How to realize the best possible condition of getting rid of burnt gases is the problem. In view of the fact that the piston does not sweep the whole space, some of the mixture, after it is burned, must depart under the force of pressure. After the terminal pressure dies out the part of the gas



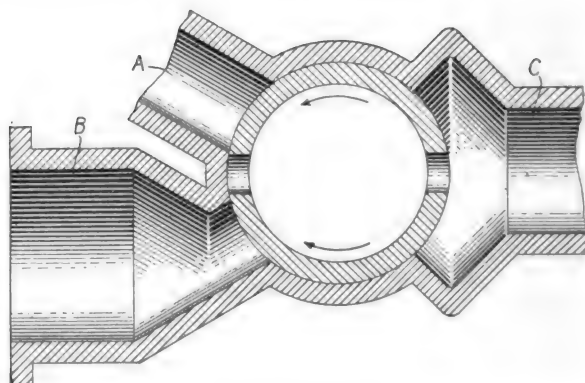
To Assist Cylinder Cleaning.

that is usually left behind is that which accounts for bad scavenging. It has been found in practice that the scavenging condition may be improved by using a small-diameter pipe between the transfer port on the exhaust side of each cylinder of the motor, and a receiver, as shown in the illustration, A is the cylinder, B the individual exhaust pipe, C the receiver, and D the arm. In this plan, owing to the small diameter of the connecting pipe, the speed of the departing exhaust product is accelerated, and the exhausting "fluid" is compacted. The gas molecules seem to persist in accompanying each other on the journey, and the tail of the

gas body follows the head, and in this way the rarefied gas in the combustion chamber at the tail end of the exhausting period follows in the train of the departing fluid, thus more or less completely scavenging the space. It has been found under certain well defined conditions that a vacuum will reside in the cylinder after the exhaust leaves, which vacuum very readily fills with the incoming mixture.

For Use on a Down Grade.

As a motor has one power stroke to three strokes that produce losses, these losses may be taken advantage of when an automobile is going down a steep hill to do which requires that the spark be cut off and the automobile thrown into low gear. Unless the hill is very steep the



Section of a Valve.

drag of the motor will be sufficient to check the momentum of the car, and the brakes may be saved from wear and tear. The only disconcerting thing about this plan lies in the fact that a muffler explosion will follow when the spark is thrown on again. The illustration is a section of a valve which may be placed in the intake manifold between the carburetor and the cylinders. It will be seen that by turning the valve to one position the mixture from the carburetor may pass through the shell of the valve and on to the cylinders in the regular way, but if the valve is turned to its second position air will be admitted to the motor, and the passageway from the carburetor will be shut off. A valve of this description placed in the intake manifold controlled by a mechanism from the dash would permit of cooling the motor on every down hill by the cold air admitted, and the checking of the motor would supplant the brakes. The exact amount of the checking action might be varied at will by sliding the gears to any one of the positions available, it being the case that the motor will drag the most when the sliding mechanism is in low gear, and the amount of the drag will decrease as the gears are manipulated through the respective changes, being least on "high." This plan has the further virtue of keeping mixture out of the motor and the system beyond, unless it is ignited in the regular way. The economy of operation from the fuel point of view will be improved; and the fresh air, as it sweeps over the heated surfaces of the combustion chamber, will gather up some of the free carbon and sweep it out through the ports.

In the illustration A is the pipe from the atmosphere, B from the carburetor, and C to the motor.

Engine builders are beginning to see the wisdom of placing a pet-cock in a central position on the intake manifold. Where this is done the removal of carbon deposits by the approved method of injecting alternate doses of kerosene oil and water may be readily carried out.

BORE AND STROKE.

Also Vibration and Noise and the Way to Secure the Most Efficiency.

(John Wilkinson Before the Society of Automobile Engineers.)

In the earlier days of the automobile industry the ratio of the stroke to bore of a gasoline engine was not a much argued question. Engines of equal stroke and bore were quite common, as well as engines with longer strokes; among the latter, as I remember it, the $4\frac{1}{4}$ in. \times $5\frac{1}{4}$ in. engine was very common. Later the square motor became well-nigh universal both in this country and abroad.

It was at this time that the horsepower formula, the square of the bore in inches, multiplied by the number of cylinders and divided by 2.5, came into general use, being adopted first by the Royal Automobile Club of Great Britain and later by the Mechanical Branch of the Association of Licensed Automobile Manufacturers. This formula was meant only as a working one relative to the almost universal practice of equal bore and stroke. As such it served its purpose well, but today is out of date because the practice has changed somewhat. Three or four years ago the so-called long-stroke motor began to come into use abroad. Its use in England was first stimulated by a four-inch race in 1908, in which the size of the engine was limited to a 4-inch bore, stroke not being limited. As the power of a motor can be increased by increasing its size in the direction of stroke as well as bore, this naturally led to the building of motors with strokes of more or less extreme length.

Another strong incentive for small-bore, long-stroke engines is the English annual inland revenue tax based on horsepower by the formula of the A. L. A. M. This tax is pretty high, as can be seen from the following table:

	£	s		£	s
6½ H.P.	2	2	33 H.P.	8	8
12 H.P.	3	3	40 H.P.	10	10
16 H.P.	4	4	60 H.P.	21	
			Exceeding 60 H.P.	42	

Still another incentive is that the power classifications for speed and hill-climbing contests all favor the long-stroke motor.

In this country our speed contests are based as far as power is concerned on the volumetric displacement, a classification which I hope to show to be correct scientifically and practically. We have, then, in this country, no good reason for the adoption of any stroke-bore ratio other than that which can be shown to best meet our conditions. It is manifestly improper to classify all motors of even stroke and bore as short-stroke and all others as long-stroke.

If we take as the limits the ratios 1 and 2 and divide these into three classes, we will have:

Short stroke	1.00 to 1.33 ratio
Medium stroke	1.33 to 1.66 ratio
Long stroke	1.66 to 2.00 ratio

This would be a reasonable classification for the sake of definition. Most American motors are in the first or short-stroke class.

Before studying the question in preparation for this paper it had always been the belief of the writer that the long-stroke motor could not properly be run at as high a rotative speed as the short-stroke motor. This, I think, has been the general opinion, and was the view of the horsepower formula committee mentioned later. However, I have not been able to find any scientific or practical reasons supporting this view, and will attempt to explain later the reasons which seem conclusive to

me why long-stroke motors may be run as fast rotatively as short-stroke motors of equal displacement.

As relating to this question I show some of the tables of the horsepower formula committee representing the Institution of Automobile Engineers, the Royal Automobile Club and the Society of Motor Manufacturers and Traders. This was a very formidable committee, but their conclusions have been very severely criticized in many quarters. They made tests of 144 engines, 101 of which tests contain all the data required for comparing the effect of stroke-bore ratio on piston for values of R from 1 to 1.61.

Number of Tests	Stroke-Bore Ratio	Piston Speed at Max. B. H. P.
15	1.00 to 1.08	1303 ft. per min.
30	1.10 to 1.20	1240 ft. per min.
24	1.21 to 1.30	1385 ft. per min.
25	1.33 to 1.44	1414 ft. per min.
7	1.50 to 1.61	1597 ft. per min.

The report of this committee, including the detail of the data and results of each engine test, is on file in the office of this society, and is doubtless familiar to most of those present. I have space here for only a few of the curves from which the committee made their deductions.

The formula deduced by the committee is: Piston speed equals $600(r + 1)$.

Such widely varying results do not seem to me to be an accurate basis of arriving at the proper comparative piston speeds of engines. No attempt was made to show that the conclusion is scientifically or reasonably correct. This is like trying to prove a scientific fact by popular vote. There must be some accurate way of making a proper comparison of piston speeds, inasmuch as there are no unknown elements to be considered.

Vibration.

Vibration in a four-cylinder engine is caused by varying torque, noticeable almost entirely at low speeds, lack of running balance of rotating parts, the effects of which increase rapidly with the speed and which are on the average a very noticeable form of vibration, the unbalanced inertia of the pistons due to angularity of the connecting-rods, and other vibrations due to lack of rigidity in crankshaft, etc.

The vibration due to angularity of the connecting-rods is the only one having a special relation to piston speed, and in high-class engines is the one most apparent. As it increases according to the square of the speed, it is most noticeable at high speed. Proper comparison of weights involves similar designs and purposes. In our practice we use pistons as follows:

4½"	= 5.00 pounds.
3⅝"	= 2.625 pounds.
3⅜"	= 2.375 pounds.

From these figures it would evidently be fair to take a 3.54-inch piston as weighing 2.5 pounds. Theoretically pistons should weigh according to the cube of the bore and would do so if made of steel and machined inside and out. Practically, using cast-iron pistons, the larger would be a little lighter than the proportional figures.

The cubes of the bore of these two engines are to each other as 48.8 to 100; the practical weights, 2.5 pounds and 5 pounds are to each other as 50 to 100. It therefore seems that 2.5 and 5 must be substantially correct proportional weights. Our $4\frac{1}{2} \times 4\frac{1}{2}$ rods 9 inches long weigh on the piston-pin end 1.25 pounds. A similar 3.57×7.14 rod 14 inches long should weigh on same end 1.5 pounds; therefore, we must assume the vibration in the two motors to be practically the same, and

that there is no basis for the belief that a long-stroke engine is a slow-speed engine on this account.

Now is there any reason to be found why the long-stroke engine cannot be run as fast as the short-stroke? About the only other point to be considered in this connection is the friction between the piston and the cylinder. This is a function of the pressure, and the stroke \times the coefficient of friction, which gives the same result in both. We have then two mechanical machines in which the inertia of the moving parts sets up strains and vibrations of the same intensity and duration, and which are resisted and absorbed by structures of equal weight and strength, and in which the friction caused by such movement is the same.

The question of relative proper speeds is very important in connection with a proper discussion of the question. If it were conceded that of necessity either style of engine is essentially a slow-speed engine, and could not be run as fast as the other, this, in itself, would show immediately an advantage of the one of higher speed capabilities; it would not show in any way that the high-speed motor was not just as good at low-speed work.

If we take the ordinary view of the question that the long-stroke engine must of necessity run more slowly, then to demonstrate its superiority it must first be shown that the slower speed is more desirable, and next that at equal speeds it is a better engine. Further, unless it be conceded that the long-stroke motor has equal rotative speed capacity, it follows certainly that lighter, cheaper and more powerful cars can be built with the short-stroke motor.

Noise.

In regard to noise, which is today perhaps the most important question relating to an engine, we note that both engines have the same relative speed, and the same displacement; therefore they must have the same size and lift of valves and cams. So the only point of difference relating to noise will be the greater weight of the moving parts of the valve mechanism in the long-stroke engine, due to the greater distance from valve-seat to cam; the difference is unavoidable, though small, and might amount to 10 per cent.

The question of power speeds being shown to be equal depends on the thermal and mechanical efficiency, and the thermal efficiency depends on the compression and a wall surface exposed to heat of combustion.

The formula recommended for M. E. P. the committee admits gives no evidence of increase of mean pressure with bore, but draws its conclusion from the fact that this is apparent on different engines of the same make, and that it is a well-known fact that the gases in large vessels lose their heat more slowly than when in smaller ones. The first deduction is open to all kinds of criticism and is admitted by the committee itself to be inaccurate. The second deduction is entirely wrong in application because the bore is not a measure of the volume any more than the stroke. The real measure of the loss of heat is the ratio of the wall surface to the volume. The committee might reasonably have said that the greater the displacement of the engine, the higher the M. E. P., compression being the same. To go as far as the committee did, and rate M. E. P., from 68½ pounds per square inch in a 2½-inch cylinder, to 99 pounds in a 5-inch, seems to be justified by neither theory nor the facts.

Further, to deduce the effects of wall surface on M. E. P. from results taken at or near maximum brake horsepower, which of necessity was at high rotative speeds, where the sizes of valves, piping and carburetors are by far the principal elements in such M. E. P., in-

dicates a lamentable lack of perception of the problem involved.

In order if possible to get a more rational, practical view of this point, with the good aid of Mr. Clarkson, I have collected all the data of horsepower curves of our American engines that I could get. I am pleased to say that very few refused this information.

In order to eliminate as many factors as possible and to get as nearly as possible the true capabilities of the engine, the M. E. P. was taken at 800 r. p. m., which represented in every instance practically the maximum M. E. P. at any part of the curve. At this speed the effect of valve piping and carburetor sizes is largely eliminated. Of course the effects of time of valve setting is present in the results and very likely is mainly responsible for the variations. It will be noted, however, that the results are all within a very reasonable percentage of each other and close to what might be expected. No difference traceable to the size, stroke-bore ratio or internal surface as represented by valve-on-the-head, of T-head engine, can reasonably be deduced.

Two figures are given, one for the bare results, the other with the size of the engine and the style of the head. Knight engines are classed as valve-in-head; T. H. = T-Head; L. H. = L-Head; V. H. = valve-in-head engine.

Size of Engine	Style of Head	Compression per cent.	
		Clearance to Total Volume	M. E. P.
4¾x5½	V.H.	17	111
4⅞x6	T.H.	21.2	100.5
5½x5½	T.H.	21.2	99.5
4¼x5¼	V.H.	22	90
4½x5	V.H.	22	90
5¾x5¾	T.H.	21.9	89
4¼x4½	V.H.	22.4	95
4 x 5 15/16		23	101
5⅜x6	T.H.	22.7	93
4¼x5	L.H.	23	93
3¾x3¾	V.H.	23	90
4 x 5 1/8	T.H.	23	89
4½x4½	L.H.	23.5	91
4½x6	T.H.	24	97
4½x5		24	93
4½x4½	T.H.	26	90
5 x 5½	T.H.	26	84
4 x 4	V.H.	27	83
4¼x5½	L.H.	29	81.5
4½x5	L.H.	24	81

I quote the following from a paper by Mr. L. H. Pomeroy, read before the Institution of Automobile Engineers in December last:

"The writer has had two engines under observation during the past few months, which only differed in respect to their valve arrangement, one having overhead valves, the other being of the orthodox type. The compression ratios were identical and every precaution was taken to eliminate disturbing factors. The M. E. P. in each case over a speed range from 600 r. p. m. to 1,000 r. p. m. was substantially the same, about 96 pounds per square inch. The influence of marked changes in valve setting was also negligible."

Let us look a little into the theory of thermo-dynamic efficiency and see if it will give any light. The regular losses in the engine are the mechanical friction, the heat loss to the jackets and the heat going out through the exhaust. The heat lost to the jackets depends on the difference of temperature, the time, and the internal surface of the engine exposed to heat. The larger the en-

gine the greater the volume in relation to internal surface and therefore the less the relative heat loss.

Lengthening the stroke of an engine decreases the thermal loss, not because the stroke is lengthened, but because the volume is increased. Any increase in the size of an engine in the direction of either stroke or bore or both will decrease the thermal loss. It, therefore, follows that in any given size engine the less the internal surface the higher the M. E. P., but both theory and practice show this to be a very small amount. Consider the adiabatic expansion curve in two instances, one of which had no internal surface at all and the other an ordinary engine with a jacket loss of 35 per cent., and an exhaust loss of 45 per cent. The difference in the mean pressure of these curves is about 15 pounds per square inch. Our practical problem then would be: If the difference between no jacket loss and the ordinary loss is 15 pounds per square inch, what is the difference in the case of two engines of a given difference in internal surface? This is substantial, and might mean 5 pounds M. E. P. difference. Another very interesting reason why the M. E. P. does not increase with size was brought out by F. W. Lanchester, whom I quote as follows:

"There are two factors, other things being equal, that control the mean pressure—the compression ratio and the cooling loss. If we prescribe some definite limiting value to the compression ratio to be employed, then it must immediately be conceded that the larger cylinder will show a higher mean pressure, owing to its cooling losses being relatively less than those of the smaller cylinder. Thus, firstly, in the smaller cylinder the actual compression will be lower, owing to the greater cooling during the compression stroke, and secondly, the heat losses during the combustion stroke will be greater; and so the expansion curve will fall more rapidly. But, as a matter of fact, there is no prescribed compression value; the compression is limited by the question of pre-ignition. If an engine is given too high compression, pre-ignition will occur, or short of actual pre-ignition the explosions will become of a detonating character, the engine will be correspondingly noisy. The compression has then to be reduced. Now the smaller the cylinder the higher the compression ratio permissible, owing to the greater cooling during the compression stroke—in fact, not only may the compression ratio be increased, but the actual compression may be higher; for the temperature of the charge at any given compression is actually lower. Consequently, the small engine, though sacrificing mean pressure due to its greater cooling loss, will, if properly designed, receive some compensation from the higher compression that may be employed.

"It is an interesting fact that over the range of sizes commonly employed in automobile work these two influences in many cases almost exactly cancel out. Thus, in the Daimler sleeve-valve engine I have found it just as easy to obtain a given mean pressure in a small cylinder (70 mm. dia.), as in a large one (124 mm. dia.). Thus, to obtain (at ordinary barometric pressure), mean pressure as shown by the brake in cylinders of the diameters given, the following compression ratios were employed, the figures representing the total volume in terms of the clearance volume."

Cylinder Diameter in mm.	Ratio
124	4.6
100	5.0
96	5.11
80	5.6
70	6.0

The maximum brake horsepower of our two engines figured from the formula of the above mentioned committee is:

$$4\frac{1}{2} \times 4\frac{1}{2} = 1800 \text{ R. P. M. } 96 \text{ M. E. P. } 55 \text{ H.P.}$$

$$3.57 \times 7.14 = 1534 \text{ R. P. M. } 86 \text{ M. E. P. } 46 \text{ H.P.}$$

The deduction from the argument of the writer is that the variation is not worth mentioning. It must be evident that if the figures of the committee are taken that the long-stroke engine is an inferior engine.

Cooling.

The heat lost through the jacket is a measure of the size of radiator necessary. As to the effect of piston size on cooling it is undoubtedly true that the larger the piston the more difficult it is to keep cool, but the limiting feature of our present high-speed engines, with necessarily large valves, is more likely the size of the exhaust valve. It is probable that a stroke-bore ratio below 1 might soon be reached where the piston would be more difficult to cool than the exhaust valve, but we are not dealing in practice with such stroke-bore ratios. The tabulated data of American engines show the practice is to use as high compression in large engines as in small ones. So far as the writer knows there have been no experiments in regard to cooling carried on which would show us the relative effects in large and small engines. The writer has never been satisfied that if this element were taken into strict consideration, small engines would not be found superior to large ones in M. E. P., and horsepower per cubic inch of displacement.

Life of an Engine.

The life of an engine is governed largely by its speed. Either type will show superiority in this respect at lower speed. At equal speeds, there are to be noted two differences which must be considered in the design. The piston of the long-stroke engine, being shorter and yet subject to the same total friction, will necessarily wear faster. Likewise the bearings of the short-stroke engine, being subject to greater pressure at the same speed, will require more area. The friction and wear of valve mechanism cannot vary, as they should be the same in every respect.

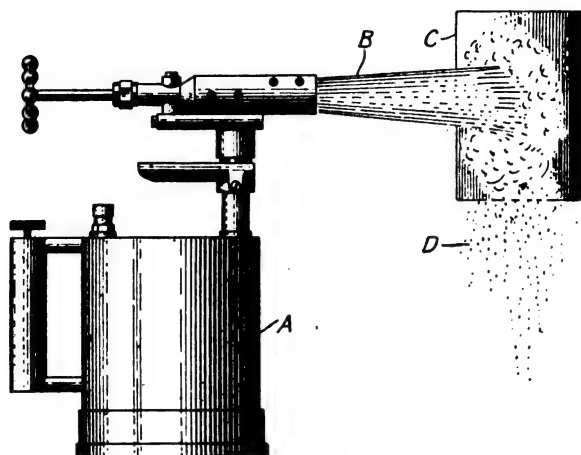
It might be interesting to note here that any increase of weight due to increasing the life of the piston in one case might possibly be balanced by an increase in the other piston from the desire to get better cooling.

Conclusion.

As a purely thermal question there is apparent no reason why the stroke-bore ratio cannot be carried beyond even a ratio of two. But as to mechanical design, awkwardness begins to be apparent at ratios beyond 1.33; and beyond 1.5 the objections become more or less acute, running into weight and expense without any compensating features. Any extra long stroke involves too much weight in the valve mechanism and a strong temptation to too short connecting rods to keep down the height and weight. With L-head engines a design beyond 1.33 exaggerates the valve pocket design. On the other hand, in block engines with two-bearing crank shafts long strokes shorten the distance between the bearings and lessen the thrust, thus diminishing the necessary diameter of crank shafts; and in six-cylinder motors the length of motor is shortened. It might be correct in placing general limits on the stroke-bore ratio to say that it is limited in one direction to one by the cooling limit of the piston, and in the other direction to 1.5 by the limits of mechanical adaptiveness.

Gasoline and Carbon.

Carbon is due to an excess of gasoline as well as to poor lubricating oil. It is highly improbable that a pure hydro-carbon lubricating oil will deposit carbon in the combustion chamber space in sufficient quantity to give any trouble at all. If the lubricating oil is adulterated there may be some cause for complaint. Gasoline is at the bottom of nearly all of carbon trouble. It volatilizes but slowly at best, and it is a fault of carburetors in general to deliver an excess of gasoline at the higher



Gasoline Torch.

range of speed if the amount of the gasoline is in the right proportion at the low speed. For the purpose of illustrating the lack of volatility of automobile gasoline all that is necessary is to take a blow-torch, as shown in the illustration, fill it with gasoline, light the torch and set it down in front of a plate at a distance of four or five feet, and then by turning on the gasoline so that it squirts out with considerable pressure it will be found that the more volatile fractions of the liquid will burn, and the less volatile parts will strike the plate and fall down to the ground without burning. If this less volatile product is collected in a pan, and it is then allowed to cool off, as a further proof of its non-volatile properties a piece of newspaper may be set on fire and thrown into this pan of liquid, only to find that it will quench the flame. The non-volatile part of the average gasoline mixture is not far from 50 per cent. In the illustration A is the gasoline tank, B the flame, C the plate, and D the falling drops of gasoline.

Life of an Automobile.

A year or two ago an article was extensively printed which seemed to have been written for the purpose of showing that the automobile was short-lived. Strange to say, there was little or no attempt on the part of manufacturers to correct this erroneous feeling. Evidently, the fact that to most purchasers the length of life of a car is the most important consideration, seemed to have little weight. But to quote the words of one of the oldest men in the business of overhauling, rejuvenating and selling old models, "an automobile never wears out if it is treated right." To treat it right, it must be looked after by capable mechanics, who see that wornout parts are replaced in time to save the rest of the machinery. The greater part of the expense is in getting at the parts, and this is being reduced by better arrangements and by increasing the durability of the wearing surfaces.

Transmission gears should be replaced once in from 30,000 to 50,000 miles. The gear shafts probably run in ball or roller bearings, which outlast the gears and are more easily replaced. Propeller shaft joints, axle bear-

ings, brake linings, all last from one to three or four seasons, and in none does anything have to be replaced except the wornout parts.

Cars built as most of them are today become superannuated, not because the big and expensive parts wear out, but because of the little difficulties, which, if attended to at once, would involve only a trifling expense.

Many owners of old cars complain of the noise these veterans make. It is true, in comparison to the purring new machines of the latest output, the two and three-year-old models seem noisy, but the very loudest puffers can be made to soften their tone and in many instances become actually genteel in their vocalization if the soot be cleared from the cylinders and the various cups, joints and bearings carefully and conscientiously oiled.

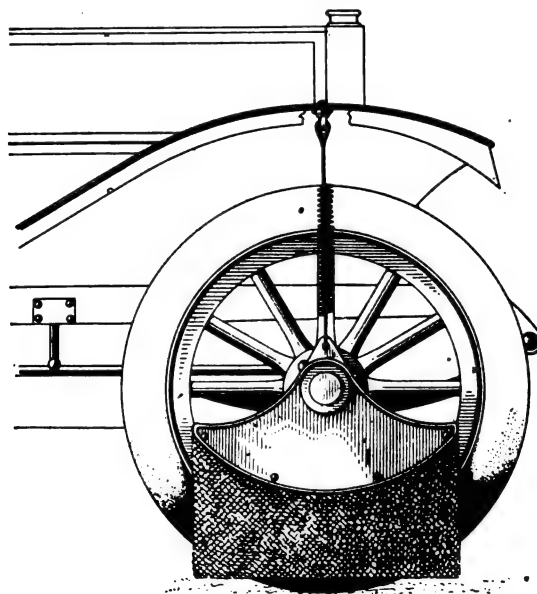
That the steering gear wobbles on its pivot bolt, the crank pins are loose on the connecting rod, and the Cardan joints of the propeller shaft are worn, by no means indicate that the car is ready for the junk heap.

Long before the engine, as a whole, is anywhere near wearing out, parts like the above-mentioned will require tightening and adjusting. Leaking radiators and loose brakes, though sometimes serious enough to lay up a car, are matters of small expense to put into shape again. In too many instances the depreciation of a motor car, as well as the high cost of its maintenance, are due to the employment not only of inexperienced chauffeurs, but also dishonest ones.

The bill for maintenance and for repairs will diminish as soon as the owner becomes acquainted with his car sufficiently well to know what it needs, so as to be able to issue minute instructions regarding the work he requires.

Splash Guards.

The city authorities of London have taken under consideration the complaints of pedestrians that mud-baths are forced upon them every wet day by motor-omnibuses



Steel Mesh Shield Prevents Mud from Flying Outward from Automobile Wheels.

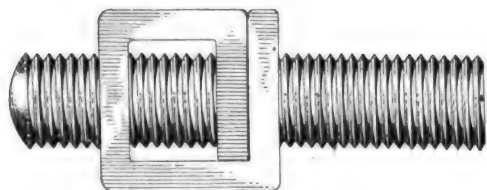
and other street vehicles. Consequently, several tests have been made of a steel-mesh splashguard designed to keep the mud from flying outward when a wheel drops into a puddle. The splashguards are suspended from the hubs of the wheels, the bottoms reaching to within a fraction of an inch of the ground, and forming a shield between the wheels and pedestrians.

In one of the tests a white screen was erected on a

suburban road near a mud puddle. Only a few tiny drops of mud were splashed upon it by a motor-omnibus equipped with the shields, while a broad, checked pattern of black and white resulted when the splashguards were removed.

A Lock Nut.

Various devices are used for locking nuts to keep them in place, and, while many of them are of value, there are few good ways to lock a small nut without a cum-



Device for Locking a Nut.

bersome attachment which requires considerable time to adjust it in place. The nut illustrated is applicable to any size bolt, yet it is especially adapted for use on batteries, or small machines. The nut is formed so that it will bind on the threads sufficiently to keep it in place wherever it is set.

Gasoline Fires.

Automobile fires generally start from a leaking gasoline tank, a loose gasoline pipe connection or flooding carburetor. Generally, the igniting flame comes from a back fire in the carburetor, but a red-hot exhaust pipe or leaking high tension wire could also start the blaze. The first thing to remember is to keep cool, for there is rarely any danger of an explosion, and the second requisite is to shut off the gasoline supply valve.

If the carburetor is on fire, it will then quickly burn itself out without damage to any other part, and can very often be blown out by getting close to it and giving a vigorous blow.

If the fire is in the drip pan underneath—always punch a few small holes in this pan to drain off gasoline and oil—a few handfuls of dust or sand will put it out without damage to the motor from the dirt.

In the event of a larger fire, only two things can help you—smother it with any cloth handy or use a regular fire extinguishing compound. Water, of course, will only scatter the fire to more inaccessible places, so the idea must be to so cover the flames that air cannot reach them. Gasoline without air will not burn. A regular fire extinguisher simply generates a heavy gas which envelops the flames and keeps out the air.

It is an easy matter to make a good extinguishing compound by dissolving a quarter of a pound of hyposulphite of soda in a pint of water and add three ounces of ordinary ammonia. This should be poured in thin glass bottles, which will readily break when thrown, and placed about the garage and in the car in case of emergencies.

Do not neglect to clean the dust pan under the engine. It is very likely to contain an accumulation of gasoline which does not evaporate so readily this cold weather, but which is very readily ignited, however, therefore, a constant source of danger from fire.

Lamps and trimmings may be lightly coated with vaseline or thick grease when the car is about to be taken out in the rain. It will serve to protect the polished surfaces from the stains and blotches.



This department is intended as a "trouble clearing house" for car owners, dealers and repairmen. Inquiries in relation to marine motors will likewise be answered, as they are of interest to car owners and others who use the two-stroke cycle engine.

Readers are requested to make criticism and comments or to freely discuss any subject of interest to the automobile industry, and to add information of their own experience in remedying troubles.

Inquirers are asked to give the fullest information in every case so that replies may be made intelligently, and thus be of interest not only to the inquirer but to others.

914

A Clicking Noise.

From A. B. C., Connecticut.—I have a 1910 Chalmers Detroit 30 that has always run very nicely and does now but for one thing; it makes a clicking noise that I cannot locate. Have had different garage men look at it and our shop mechanic who does all our auto repairing, but none of them can locate the click. It sounds like the seating of a valve and all hands have said it was in a rocker round but those have all been made snug and tight and the click is still there. It makes no difference in the loudness of the click whether the car is standing still with the engine running or going at twenty-five miles an hour up a hill. Have you heard of a similar case?

Reply.—It looks to us as if your trouble might be caused by a broken piston ring. One of the best means of locating such noises is a physician's stethoscope, applied to various parts of the cylinder and other parts, of course with the motor running.

915

Trouble of a 1907 Model.

From Mr. B. H. Hankins, New Jersey.—I have in use a Maxwell Runabout, 1907, Model R. S. two-cylinder, battery ignition, Splitdorf coil. It seems to me that one of the cylinders runs better than the other. By holding down one of the vibrators, the engine runs fast. Releasing this, and holding down the other, the engine loses power and finally stops. If speed is cut down when about turning comes, difficulty is experienced in regaining speed, without resorting to first speed. I also find if the engine is left running with spark retarded, and if an attempt is made to speed up the engine it goes dead, and it is only by the aid of the cutout that I can prevent it. I find it hard to crank the engine, it firing only when the spark is advanced, and apparently when the firing connection of a certain cylinder is reached. What is considered the best spark plug for battery ignition, and the proper method of cleaning cylinders of this type?

Reply.—Your motor is five years old. This in itself is cause for the suspicion that one of your cylinders has rather poor compression, as a result of wear. You should be able to tell whether or not such is the case by trying the compression in each cylinder separately. If the compression is good, and the valve timing is correct, your trouble is either ignition or carburetion. To test out your coils change the primary and secondary wires where connected to the coil, so that the right hand coil will be used for the other cylinder. If the opposite vibrator then gives the same results, the trouble is probably due to the carburetor which will not completely vaporize the heavy gasoline now on the market. At slow speed the gasoline apparently loads up in one branch

of the manifold, due to imperfect or incomplete vaporization, and when the throttle is opened quickly the engine is "flooded" with gasoline. The trouble you are experiencing is by no means a new one with that type of engine as you will notice if you will look over the Trouble Department of the past two or three issues. The hard cranking you experience is evidence of the diagnosis we have made. There are good spark plugs advertised in our columns. No living man knows which is the best spark plug made. The proper method of cleaning cylinders, in our judgment, consists in removing them and scraping out the carbon deposits. Kerosene is not so effective, but may prevent its deposit if used sufficiently often.

916

The Engine Skips.

From J. B. Bartlett, New Hampshire.—Can you tell me what the trouble is with my magneto? The engine skips something fierce with the ground wire on, but by taking the ground wire off, the engine goes fine. But the switch has no effect on it, as the switch is on the ground wire. The wires are all right, the switch is all right, and the brushes and make and break contact are all right. I want to fix it so that it will run all right with the ground attached as the magneto is on all the time if it isn't. I have cleaned the armature.

Reply.—You surely could not expect an intelligent reply when you do not specify the make of your magneto, whether high or low tension, direct current or alternating. Neither do you give the name of your car that we might tell something of what the ignition is. It looks as if your magneto was one that has to be grounded through the switch and ground wire to cut out the magneto. If you will give us the needed information, we will try to help you.

917

The Mixture and the Gasoline.

From J. O. Bayless & Son, Indiana.—We have a Ford Model T touring car, purchased new two years ago with which we have had several troubles, some of which may be somewhat related. First, it often starts hard at this time of the year, either on batteries or magneto, if it is just moderately warm, especially if the carburetor is not opened about one-fourth to one-half turn. It starts more easily the first time in the morning or when the engine is very hot than when it has been run a few minutes. We can get plenty of speed if the roads are good and everything is favorable, but with a little grade, mud or wind against us, we are sometimes nearly stuck. The car is equipped with a Kingston carburetor and coil and K-W Master Vibrator. It seems to us a different carburetor might improve matters, but have read in your valuable journal that a car seldom needs a new one if it ever worked properly with the old one. This car like several others of its kind near here, has the bad habit (at least that is what some repair men here call it) of trying to run over the person that cranks the motor, unless the brake is set very tight. This, as a rule, is worse in the winter, but to some extent comes at spells regardless of temperature. This car like the Dutchman's car "Sam" helped to start, was nearly worn out in its crank when we hit upon the plan of jacking up one rear wheel before cranking in very cold weather, as it was almost impossible to turn the motor over.

Just one thing more: The last two months oil has been working out past the two back spark plugs and bolt holes very much. The last time we removed the head for cleaning, we put in a new gasket, but there was no improvement. Does this oil work past the pis-

ton rings because they are worn? We think the compression seems to be about the same in all cylinders and compares very well with other Fords, but we may be mistaken. Any suggestions you may make that will help us in any of these troubles, will be greatly appreciated.

Reply.—Your motor seems to be not developing its usual power. As you do not mention any ignition troubles, we quite naturally infer that your ignition is regular in all four cylinders. We presume that you have not noted any decrease in the compression in any one or more of your cylinders. Both of these causes would show the results such as you have described. If your valves are tight and compression is good and your ignition system is efficient, your motor does not start for one or two reasons, viz.: either too much or too little gasoline in the explosive mixture. Ford cars are not equipped with priming cups, except late models, where priming plugs are installed. We advise you to equip your motor with spark plugs equipped with means for priming through the plug. Very many cars cannot be started without resource to priming due to two usual causes, heavy and hard vaporizing gasoline and too large an opening for "fixed" air through carburetors designed to use the lighter gasoline in the market two years or so ago. We think both these causes are present in your case, added to which in all probability are leaks of air from worn valve stems and valve stem bushings which tend to impoverish the mixture by dilution with air at those points. This makes the mixture very weak, with a tendency to backfire when attempt is made to start. The large opening for fixed air in the carburetor does not completely vaporize the gasoline, which latter is liable to collect in the manifold and at certain times give you too rich a mixture. The remedy is new inlet valve stem bushings if they are very loose; a bushing to reduce the size of the venturi tube in the carburetor, which will be sent you by Byrne, Kingston & Co., Kokomo, Ind., on request, and means of "priming" your motor when starting. Your transmission must drag in the ahead motion. It should be carefully inspected and adjusted so that it is perfectly free either in the ahead, neutral or reverse positions. We think the hard cranking is no doubt due to the drag in the transmission and this hard cranking may be mistaken for good compression. The oozing of oil shows that too much oil, or too thin an oil is being used in the two rear cylinders.

918

Loose Gearing.

From William F. Koch, Michigan.—Please inform me if an undersized gear wheel on a cam shaft, with the teeth of the wheel wobbling between the teeth of the drive gear (about 1-16 inch play), would tend to loosen the cylinder. The shaft is on the exhaust side of four cylinders, 30 h.p. motor.

Reply.—We do not see how lost motion between the cam shaft and crank shaft gear teeth could loosen the cylinder. This play would quite naturally tend towards lessening the power of the motor due to imperfect timing of valves and ignition. The looseness, if caused by wear, would give too late exhaust valve opening rather than too early closing.

919

It Loses Power.

From Wm. R. Crain, Nebraska.—I have a Regal 30, 1910. Has been run not to exceed 2,000 miles. It is in good repair, and runs fine except it hasn't quite as much power as it used to have and now on starting out it runs fine and pulls well until it gets warmed up, then if I have to pull a hill, it will lose power and there will be

a pounding in the engine, or if I am running along on nice level road and pull the throttle open, it will pound the same as it does when pulling. Had the engine cleaned for carbon last fall and the car was not run any last winter and I use quite a little coal oil on the engine. I use the coal oil through the air intake. Is this the best way to use same? Answer me by letter and oblige.

Reply.—A car two years old is always viewed with suspicion for worn pistons, rings and cylinders. Your symptoms would seem to indicate that the pressure in the combustion chamber of one or more cylinders held better when the oil was cold than when hot and thin. Your motor is getting abuse of no little amount when you pull the throttle open quickly. Spark advance and throttle levers should always be moved slowly, if one wants his motor to give best results and last. The pounding is undoubtedly caused by too early ignition, although a too rich mixture may possibly be the cause. Kerosene is always best taken in through the inlet manifold, although it can be used through the priming cups to good advantage when the motor has been run and the cylinders are good and hot. We advise the use of kerosene about once a month, followed by a thorough cleaning out of the crank case and timing gear housing every time, for very best results. Gasoline is harder to vaporize now than two years ago and carburetors are now designed for the heavier fuel. We think that a more modern carburetor might help you in a measure. The manufacturers of your car should be able to advise you in this matter, as they have undoubtedly experimented with various makes and know from experience what make gives them best results, and what size is required.

920 Carburetor Trouble.

From G. E. Hiedeman, Iowa.—Your information in the February issue regarding my Jackson 30 did not end the trouble. After grinding in a new float valve it still got too much gasoline. I then installed a new float and lowered the gasoline level which gave the same results. Should the carburetor flood if you spin the motor? I installed a pet cock on the intake which gave the most relief, but it still gets too much gasoline and it does not pull like it used to. I wish you would let me know what you think of it.

Reply.—It is possible that there is a small pin hole between the air passage and float bowl through which gasoline seeps, or there may be an imperfect joint between the shoulder of the spraying nozzle and the air passage. It is nothing unusual for a carburetor to drop gasoline after stopping a motor, but such a dripping or apparent leak should not last longer than a few minutes, or until the gasoline trapped in the inlet manifold has leaked out. Flooding should not be caused by spinning the motor, except from "backfires," pressure is occasioned in the float bowl, as might occur if the cork washer between the cover and body is left out. It looks very much as if the pin on which the float lever hinges was bent, and that the float action was not free, sticking slightly, which does not allow the gasoline to enter the bowl until the level is very low, and then the float does not rise sufficiently freely to shut off the supply.

921 Several Queries.

From H. J. S., Iowa.—Will you kindly give me your opinion in the next issue of the following questions, referring mostly to an air-cooled four-cylinder motor:

- 1—Will too lean a mixture cause the motor to heat?
- 2—When the intake valves close from 35 to 50 degrees on compression, why is not the gas forced back into the

manifolds? Can you give the effect of this back pressure? 3—In setting air-cooled engine valves in factories I have noticed that the intake opens before the exhaust is fully closed, invariably a lap of ten degrees. What effect would this have toward cooling the engine? 4—What is considered best to oil valve stems with on the exhaust side of air-cooled motors? 5—My air-cooled engine will heat beyond the proper point for greatest efficiency if the intake is closed 30 degrees after center on compression stroke, but when set 50 degrees after it gives more power at any time and cannot be over-heated. The intake opening is the same in both cases, dead center changes made with cams; exhaust opening 45 degrees ahead of center and closing 5 degrees after. Explain the effect and why? 6—Will taking heated air through the regular intake of the Schebler L or any make of carburetor have a tendency to make the engine heat, referring to an air-cooled engine? I would like to hear from other users of air-cooled engines.

Reply 1—There will be less heat developed if a mixture is "lean" and more heat if the mixture is "rich." In the latter case there will be a loss of power with an increase of fuel consumed. The excess fuel will therefore cause heating while a "lean" mixture will not.

2—Owing to the inertia of the gas in the intake manifold there is a partial vacuum in the cylinder after the piston starts back on the compression stroke. The higher the motor speed, quite naturally the greater the vacuum, which also increases with a closing of the throttle. If the motor were to be run very slowly with throttle wide open, the effect would be to blow gas back through the carburetor or into the inlet manifold where it might be taken into another cylinder.

3—The lap of intake and exhaust opening should have no effect towards cooling the engine.

4—Kerosene, to which is added a small amount of flake graphite will be found extremely efficient.

5—The object of opening the exhaust early is to allow for getting rid of the products of combustion with the heat that the gases contain, as early as possible, and as completely. The inlet valve timing is to allow of smaller charges of explosive gas unmixed with hot gases remaining in the cylinder, rather than gas impoverished with hot exhaust gases remaining.

6—The extremely small amount of heated air taken in as an aid to carburetion should have no appreciable effect towards heating, unless the mixture is made over rich as a result of the heat. In general we have to say that the proper setting of valves in air-cooled engines is a developed art, the result of a vast amount of experimentation. Our advice is for all users of air-cooled cars to follow the factory timing and not attempt to revolutionize recognized authoritative practice unless there is an apparent excess of cars on hand, and even in such cases a car or two distributed among one's friends might be more productive of that "satisfied feeling."

922 Needs Thicker Oil.

From J. A. Wicker, Indiana.—I drive a 1911 Flanders car. My oiling system is splash as you know. I bought the car second hand and when I first bought it I had no trouble that I knew of in this way. Today I drove about 40 miles and used something near three quarts oil. I am using a light oil as directed by the company. My spark plugs, of course, tonight are very dirty. My car smokes nearly all the time. Old drivers of my acquaintance tell me my compression is good and engine is good. It throws out lots of the oil around the valve

plungers. I see a way in last month's Dealer to fix that, but the cylinders get too much, I know from the smoke and soot. Please recommend some good oil.

Reply.—Go to any reputable garage in your locality and purchase a thicker oil, some recognized standard brand, and be sure you get it in the original sealed package, and then use it very much more sparingly. If a car has been used a year or two the chances are that a thicker oil will give very much better results than an oil of thin consistency.

923

Lost Motion.

From A. Deppel, Cleveland, Ohio.—I have an E. M. F. car. There is a knock in the motor due to side play of the bearings on the crank shaft. I took these bearings up and they fit so that there is no up and down play whatever, but still it pounds. Kindly tell me how this can be corrected.

Reply.—To prevent the knock you will undoubtedly have to take out all lost motion. This means but one remedy—new bushings, unless it is possible at considerable expense to lengthen the bearings by soldering or otherwise building on to them. New bushings will be much cheaper and more satisfactory in the end.

924

The International Car.

From V. K. Hardin, Kentucky.—Please answer the following questions: 1—What can I do to keep the oil from leaking out of the crank case and transmission gear on my International car Model D? The oil leaks around the crank shaft ends and bearings. Would the use of a little flake graphite with the oil be any use? 2—I have a great deal of trouble with my magneto pulley slipping on the fly wheel. What can I do to prevent this slipping, and to prevent the oil from getting on the fly wheel? 3—What causes a spark to appear on the timer terminal next to the magneto when the engine is running? 4—Is there a muffler made that will quiet my engine down the same as some other automobiles where you cannot hear any noise at all? What make and size of muffler would you advise me to get? I have thus far had no trouble with my car, and consider it one of the best for a farmer on hilly roads. I have carried as high as five grown people and three children and pulled it up very steep hills. I have never seen any mention made of this car in your magazine, and I would like to hear from other owners.

Reply 1.—You will probably have to put in better fitting bearings. Under no conditions should graphite be put into the crank case, as it will give you no end of trouble by short-circuiting your spark plugs. 2—The oil and grease that exudes from the bearing is the cause of the pulley's slipping. Tight bearings will keep oil from the flywheel. 3—Probably a leak of current due to defective insulation of the timer terminal. 4—There are plenty of good mufflers advertised. One of these is the Kingston, manufactured by Byrne, Kingston & Co., Kokomo, Ind. Write them for size best adapted for your motor. The Yankee is, also, a good muffler, so also is the Ejector muffler.

925

Needs a Different Carburetor.

From Nelson A. Heffner, Kentucky.—Have had considerable trouble with my Buick No. 10 the last few months trying to throttle it down so that it would run without jerking. Have tried everyone's idea but have not found the cause. When I am pulling heavy up hill it will go up at a speed of two or three miles an hour with ease, but on level ground when the throttle is closed it has a popping sound in the muffler. If I give the

carburetor (Model D Schebler) a little more gasoline it then gives too much on high speed. It does not pop in the carburetor but in the muffler. It has not done this before until I put in a set of Best Plugs which they guarantee for this particular machine. I sent the plugs back to them, but they said they were all right and returned them, but I cannot get satisfaction out of them. A garage man told me the other day that the Remy magneto would not allow the car to run slow as it would not produce the current, but if it does the work when pulling heavy why not when pulling light? I use considerable oil, say about one quart every 25 miles, which I think is too much. I also forgot to mention that when it is throttled down it will fire on two or three cylinders for a little bit then suddenly stop as though the current or gasoline were quickly turned off. I can adjust the throttle so that it will run the engine at a speed of 15 miles an hour and not miss, but under that it does no good. Would appreciate any information any Buick owners could give me on the subject. Would also like to know a good scheme to keep the radius rods from rattling. I have tried the valve cages on the motor, also the manifold for any leaks; tried all wires to see there were no short circuits and examined the carburetor thoroughly. The motor gets plenty of gasoline at high speed, but not enough at low; compression good as I can get it. The fourth cylinder seems to lose it very quick. I have to grind the valves on that and second cylinder quite often. Thanking you for any information you may be able to give me.

Reply.—We do not believe you will be able to overcome your trouble without the installation of a more modern carburetor than the old Model D Schebler, one that will handle the heavier gravity gasoline now on the market. The Model L Schebler should give you better carburetion. The Model D carburetor should be adjusted for low speed by means of the adjusting needle valve only, while for high speed the adjustment should be by the tension on the automatic air valve only, leaving the gasoline valve entirely alone when making the high speed adjustment. If the mixture is too rich at high speed, reduce the tension and if too poor, increase it. The popping in the muffler is due to missed explosions, probably from too much gasoline and quite likely from too much lubricating oil. You cannot expect badly "sooted" plugs to fire regularly. The Remy magneto will produce sufficient current to run the car at slow speed, as proven when you are pulling heavily on a grade. It is quite likely that your exhaust valve springs are rather weak, thus accounting for inability to throttle to slow speed. It is also likely that the inlet valve stems are so loose in their guides that at low speed a considerable amount of air enters there, sufficient to impoverish the mixture, not an unusual occurrence.

926

Magneto Trouble.

From Dr. G. R. Keen, Kentucky.—I would be glad to have you give me some information in regard to my car which has been giving me trouble recently. It is a Maxwell runabout, 16 h.p. Model A. B. 1911. It has a Splitdorf magneto, Model H. The car has been in use about one year. A short time ago I began to have trouble with the engine when running on magneto. It would start all right and run fine on battery but when I would switch to magneto, it would stop unless the car was running very fast. It has grown worse until now it will not run on magneto at all, but runs fine on battery. I have had the car thoroughly overhauled, all newly wired, all parts cleaned, but it did not improve matters.

The repair man said the magneto was all right, else the car would not run on battery. I would appreciate any information at the earliest date possible.

Reply.—The contact points in the breaker points should be carefully smoothed with a fine file and adjusted. If this does not remedy the trouble (we think it will), it will probably be necessary to take it to some one who is familiar with magneto construction and have it looked over, or returned to the Splittorf factory for repairs. The Model H Splittorf magneto gives two simultaneous sparks, and unless the interrupted contacts are smooth and properly adjusted as to the distance apart, it cannot ignite your motor properly, even if it generates sufficient electric current. Sometimes the magnets of the magneto are demagnetized by improper wiring, the battery discharging through the magneto.

927 **Misses and Heats.**

From Jules A. Dornier, Louisiana.—Please advise me if by using two different spark splugs, say of the makes of Monarch and Mosler Spitfire on my Ford Model T, could cause irregular explosions. On cylinder No. 1, I have a Monarch plug, on No. 2 I have a Mosler. On No. 3 I have a Monarch, and on No. 4 I have a Mosler. Can this cause my motor to have irregular explosions? I have changed my vibrators, top and bottom, cleaned my engine well, and still it misses and heats on a short run. I am at a loss what to do to remedy my trouble. Would you please advise me in your next issue?

Reply.—It is more than likely that the brush of the magneto terminal has accumulated some hairy-like particles of carbonized fibre and if these are cleaned off, your motor will run much more regularly. Missing in Ford Model T cars can frequently be stopped by slightly reducing the spark gaps in the plugs. If gaps are too long in a part of the plugs, irrespective of the make, they may cause irregular ignition. Too late ignition, imperfect circulation of water, clogged water jackets and radiator and too much gasoline are all prolific causes of overheating. Your ignition should occur as early as possible without causing "knocking."

928 **He Has a Knock.**

From Dr. E. J. Schnaidt, South Dakota.—I have a Ford, Model T, 1910 touring car. At times there is a knock as of a loose bearing most noticeable when the spark is advanced, running down hill, or when the momentum of the car is carrying it faster than the engine drives; also when running idle. Had the car apart but could not notice that the bearings were loose. The knock seems to be in one cylinder only. Otherwise the car runs very smoothly. The cylinder bore on the last cylinder seems to allow play of piston. Could this be the cause?

Reply.—We are strongly of the opinion that the knock is due to a loose fitting piston. You can locate the knock very easily by using a physician's stethoscope, and if you find it to be in the last cylinder, it would be further evidence that our conclusion as to the cause is well founded. There are, however, many causes for knocks in gas engines, such a pre-ignition, loose bearings and imperfect alignment.

929 **After Six Years.**

From Frank H. Sherman, Rhode Island.—Please advise me if possible as to the cause of following trouble with my 1906 Model E Locomobile to which I have fitted a Rayfield carburetor and unisparker. The car runs fine on level and grades, but on hills it chokes up and

does not pick up when the clutch is thrown out. The carburetor is carefully adjusted and the ignition is all right. Would carbon in the cylinders or a weak exhaust valve cause this trouble? I have had the carburetor and pipe line down and found all clear. Have not ground in inlet valves, but have exhaust valves and the compression is good.

Reply.—We are strongly inclined to ascribe your troubles to the fact that your car has seen some six years' service, having been marketed possibly late in 1905. We know the Rayfield carburetor to be efficient when properly adjusted in accordance with instructions that accompany each one sent from the factory, and we are never called upon for assistance or advice when unisparkers are used. It is a question in our mind as to whether the motor chokes up on hills, because it gets too much gasoline, or gets too little. We do not know what you mean by a "weak exhaust valve." Carbon in the cylinders could hardly cause the trouble, although the muffler might become partly clogged by carbon deposits, and the effect would be about as described. If by "weak exhaust valve" you mean exhaust valve springs, we have to say that they are often responsible for erratic and uneven running. If your motor loads up with gasoline on opening the throttle, it shows that the adjustment of the carburetor is not correctly made.

930 **A Peculiar Knock.**

From Wayne Van Pelt, Ohio.—In regard to a peculiar knock, which I have in my 1910 Model T Ford car, if you can give me any advice from my statements, please do so. The car has been run about 12,000 miles, has been overhauled and rebuilt with new pistons, piston rings, new boxes that were needed; valves reset and timed properly; new carburetor, timer, new primary and secondary wires. In fact everything that was thought to be needed. Now the car runs all right, pulls good and I know that there is no knock in the main bearings or connecting rods, but this is what I want you to think about: There has been no repairs put on the timing gear. That is, the apparatus or gear that works the cam shaft. It is a knock that is noticed plainly all the time; not so plain when the spark is retarded. It sounds like a clicking noise in the gears or cogs. Now can it be that it is in the cam shaft or push rods or in the cam shaft boxes or where? I feel sure that it is in that timing business. What would you advise me to do, get new gears in front or new cam shaft, push rods or what? If I should get new gears how should I mark the cam shaft to put the new gears on to time with the engine? I don't know that this knock hurts anything but I don't like to hear it. Please give me your full opinion.

Will you also advise me about my electric lights? I am using a 6 volt 10 c. p. bulb. They don't seem to be quite strong enough. They don't effect my engine a particle. What strength would you advise for a stronger light? Would more voltage or more candle power be better and less likely to effect my magneto?

Reply.—Your knock is quite likely in the cam shaft gears or valve push rod bushings. If you order new gears ask the Ford Motor Company for instructions as to timing, or you can mark the opening and closing of both inlet and exhaust valves and set the valves as they are now set. It would be safer for you to follow Ford instructions. Lamps of 5-volt 10 c. p. capacity would give you brighter light. The higher the voltage the dimmer the light. If voltage is too low the lamps will burn out. Do not use any higher than 10 c. p. It would be safer to use less, as far as the magneto is concerned. Six should be enough if your reflectors are correct.

931 **Hard Starting.**

From J. D. Krause, Minnesota.—I own a Regal "30" car of 1910 model four-cylinder. The car seems to be perfect in every particular and has sufficient power and could not run better, but on cold mornings I cannot get her started without filling the radiator with hot water and priming the cylinders. I cannot get her started without priming when she is warm excepting she is hot. After once started she runs fine and is economical in the consumption of gasoline. I do not believe a short circuit exists as I have rewired the car with Packard cable. Can you tell me from this description where the trouble can be?

Reply.—Without a doubt your trouble is due to the heavy hard-to-vaporize gasoline, and too large an area for the constant or fixed air opening in the carburetor. Some 74 degrees gasoline for priming your motor will probably assist you. See our reply to J. G. Bayless & Son, Indiana, a copy of which is enclosed herewith.

932 **Possibly a Weak Mixture.**

From George W. Smith, Connecticut.—I own and personally drive an Abbott-Detroit five-passenger touring car, with three-speed gear. It is one year old, and has run about 2,200 miles. All minor repair work on it, I try to do myself. I am very sensitive to sound in the motor, which has never given me any trouble. On the last trip, with three passengers besides myself, the motor began to "witch" a little. It was not a pound; for I think I know that sound well, though it has rarely happened with me. This present sound was a spitting, popping sound, occurring only when going up grade, and on the high gear, and with no regular periodicity about it. Every time it occurred, the car would sensibly diminish in speed, as if one cylinder was kicking back. Do you think this describes what is commonly called "popping back" into the carburetor? I have never experienced it before. I would retard the spark lever a trifle when it occurred; but that did not seem to stop it. The spark plugs had just been cleaned. The oil was running well, as shown by the sight feed. When I would go into the intermediate gear, the trouble disappeared; and there was, on the last named gear, no apparent diminution of power in hill climbing. Kindly tell me what you think is the matter. The car is equipped with a Mayer carburetor, and Splitdorf magneto, with the Splitdorf coil on the dash board. I use "AC" spark plugs. I have never yet reground the valves. I never touch the carburetor, and have had no occasion to do so. No smoke or anything visible was discernible during the attacks; and all the indication was the low, spitting, popping sound, and the quick retardation of speed immediately when each sound occurred. Sometimes the car would almost stop; and I would quickly go into the intermediate gear, when it would disappear.

Reply.—We are inclined to believe that your carburetor does not get quite enough gasoline at slow speed, as when the motor is in high, but sufficient when the motor speed increases by dropping to a lower gear. A slightly sticking inlet valve stem might also give similar symptoms.

933 **For E. M. F. Owners.**

From Arthur G. Garrett, Maryland.—I think the trouble with H. W. Guth's E. M. F. car may be attributed to one of two causes, either the low grade of gasoline now sold which is very hard to vaporize, especially when turned at such low speed as a quarter turn at a time while the motor and intake pipe is cold, or it is due to the long intake pipe used on this particular car. The carburetor is on the right side of the motor while the intake manifold and the valves are on the left, the pipe

crossing between cylinders No. 1 and 2. Now when the intake is cold, being very long, the gas condenses again on such slow speed as when turned by hand. When the motor is warm the gas drawn in through the intake pipe (which is warmed by hot air being fed to the carburetor) does not condense, but enters the cylinders, which accounts for the easy starting when warm. If he primes the carburetor and spins the motor instead of turning a quarter at a time, I think it will start much quicker.

I also notice J. A. Knowles having considerable play in his steering gear. If he takes the drip pan off his car he will notice an adjusting cup on the lower end of the steering post which is locked by a small set screw which may be turned by a screw driver. By loosening this set screw he can take up the wear by turning up the round cup, which is split where the set screw goes through in order to contract it. The 1912 E. M. F. car has the adjusting nut where the steering post enters the casing, making it much easier to take up the wear as it is not so hard to get at.

My motor has a knock in it which is inside the crank case. I have tried time and again to locate it but with no success. I have had the plate off the bottom of the crank case several times but cannot find anything loose. The only thing that I can see that could cause it is a little side play on the connecting rods bearings, both on the crank shaft and the piston pin. It may be that while running the rod slides back and forth on the piston pin, causing a knock as it strikes the piston, but it seems to knock only about once every revolution.

Hoping my suggestions may help the E. M. F. owners out of their troubles, and that you or some reader may be able to give me some information concerning the knock.

Reply.—A little end play in the crank pin bearings combined with a hole through the piston that is not absolutely at right angles with the cylinder bore, will allow the upper end of the connecting rod to slat back and forth, with the result that a slight knock results, very hard to locate. In such cases the lower end connecting rod bearing is usually found to be bell-mouthed, larger diameter at the ends than in the center.

934 **What Causes the Buick to Miss?**

From Charles L. Eginton, California.—I have been having a good deal of trouble with my type S Remy magneto on a Buick White Streak, and thought perhaps you could help me out. It misses fire very badly at any speed below eighteen miles per hour on high gear, and any speed over that will miss occasionally with the switch turned on the magneto. As soon as I turn the button on the battery side, it runs fine on any speed from two miles up on high gear. I only use two dry cells for starting and could always pull hills on high with the two cells that I couldn't make on the magneto, so I think the coil must be O. K. I have renewed the block and cam in breaker box, and the points seem good. It doesn't seem to change conditions any to tighten the contact points. Have ground the valves and cleaned all the carbon out. Have tried the gaps in the spark plugs at different openings with no results. Am using Rajah plugs; tried the Best Spark plugs but they were the same. Now by having the switch button on the magneto side and disconnecting the wire from the plug and holding it one-quarter inch or closer from the cylinder it shows a good spark at any engine speed but to hold it the same distance from the end of the spark plug, or very near, touching it shows but a very weak spark and most of the time not any spark at all. Also took the plugs out one at a time with the wire connected and the plug resting on the cylinder. With the three cylinders running, you could see it miss in the gap of the fourth

cylinder. All the wires on the car are new. Had the coil all taken apart and new wires put on a short time ago. I had this trouble before then but the new wires haven't helped any. The magnets seem very strong; will pick up a one-half pound double end wrench. Do you think it could be in the distributor box as long as the batteries work so well? Have cleaned it out good. Have cleaned and examined the plugs thoroughly. I am running the car now on the batteries all together so any information you can give me will be very much appreciated.

Reply.—It is rarely our pleasure to make reply to an inquiry that so thoroughly describes symptoms as does yours. The coil in this dual system of ignition is only used with the battery, the secondary current being distributed by the distributor, no matter whether on magneto or battery. This effectually proves that your distributor is working satisfactorily, for there is never any missing when using battery current. The trouble then is likely to be in the magnets, a leak in the primary wiring or in the high tension wiring. If you will close the gap slightly in your spark plugs it may possibly reduce the liability to miss explosions. Too much oil in the rotor or main bearings sometimes causes "leak" of current. There may be a slight leak of current around the insulation on the insulator end of the rotor shaft. It may be that at some time there has been a discharge of battery current through the magneto, due to a mixing of the wires, which possibly has partly demagnetized the magnets. See that there is no leak of current through the insulation about the terminal on the breaker box. There should be no oil in the breaker box, as any oil there will prevent a good contact between the platinum contact points. The contacts should be filed so they will come squarely together, and should not separate too much. If after assuring yourself that nothing you can do will remedy the trouble, the remedy will be to take or send the magneto to the nearest Remy service station to be tested out and repaired. These service stations are being established and their number added to from time to time, and it is quite possible there is one near you.

935 For Loosening Carbon Deposits.

From C. C. Warren, Vermont.—Please enter the following under "Vermont." What is the best device for removing carbon from gasoline motors, and what do you think of placing a pet-cock with a funnel on the gasoline intake pipe between the carburetor and cylinder and filling the same and opening the stop-cock when the motor is running good speed and letting in all that you can and not slow it down too much? Say, do this once in 200 to 500 miles? Would like your opinion.

Reply.—Instead of a pet-cock you probably are inquiring about a priming cock. This is an excellent remedy for loosening carbon deposits in the cylinder. A rather better arrangement is to use a double male end pet-cock. A small piece of brass pipe screwed into an elbow, and screwed onto the cock leading downwards will feed the kerosene from an open vessel or cup, and it will not be necessary to fill the priming cup several times.

936 Who Can Tell Him?

From Chas. M. Ertz, New York.—I have a Model T Ford and when riding over rough ground have a rattling or ringing sound in the rear. It sounds as if it were in the housings. Have had the car at the Ford Co.'s Long Island shops and tried it out on the dirt streets near the shops with a Ford employee riding on the rear; but

could not locate the cause. Had the rear wheel off and could find nothing. Now, if any of your readers could advise what this might be I would be thankful for the information.

Reply.—We would hardly care to hazard a guess as to the cause of the rattling or ringing if the Ford repair department is unable to locate it, so leave it for some of our readers who may have experienced the same trouble, and located it.

937 The Cooling System.

From L. A. Lindberg, Minnesota.—I have a 1911 Model T Ford equipped with a Holly carburetor and my engine heats up and boils the water inside of 30 minutes on the road. What can I do for it? Have tried everything I know of: advance spark, clean engine, weak gas mixture, but all to no avail. It boils out a gallon of water to every 30 miles. Have you any remedy? Please answer in your next issue.

Reply.—We are inclined to think that your trouble may be due to lime deposits in the cells of the radiator. If we are not mistaken the water in Minnesota is subject to this characteristic. If this be the cause, there is practically no sure remedy. Prevention is much better than cure—use only rain water in lime water localities.

938 Needs Overhauling.

From H. B. Tull, Indiana.—We are having trouble with our 30 h.p. Rutenber motor, 1909 Lambert car. It has a decided piston knock when opening the throttle wide for more speed even on good roads. Seems to lose power and acts in the same manner when overheated. Even with the spark fully retarded on hills and bad roads it hammers the piston. We are using the Remy magneto with no change of timing. It's the same sort of a knock that we formerly got when ascending steep hills with spark advanced, but retarding the spark now does not seem to help matters.

Reply.—The age of the motor would lead one to think that it might be due to worn parts, such as loose wrist pins or poorly fitting pistons. To locate this knock it will probably be necessary to disassemble the motor and make a rigid inspection of cylinders and all moving parts.

That Rattling Noise.

From F. E. Sample, Indiana.—I note query 913 from Dr. A. D. Grant about a rattling noise in his 1912 Ford. I had the same thing with mine and was months locating it. I finally found that it was in the connection rod from the clutch pedal to high speed. I put leather washers on both sides of the key bolt, also at the other end and the rattle ceased and never annoys us again.

For That Rattling Sound.

From Lee H. Cotton, Coloma, Wisconsin.—Dr. A. D. Grant may find the rattling sound either in the steering rods or forward radius rod connections. If these are tight, he will probably find the semi-circular metal shield on the front foot board beneath the coil box to be the source of the noise. In this case a few bits of felt or rubber will help.

That Elusive Rattle.

From Reader, Washington.—Please inform Dr. A. D. Grant, No. 913, in the June issue, that the rattle he can-

not find is in the pan where it is fastened to the engine. He can readily overcome this by driving a few wooden wedges in the engine frame on top of the pan. It took me a month by elimination to find this. The job can be made permanent by taking the engine down and putting a felt washer along the pan before bolting together.

Tire Stress and Life.

From N. M. Baldwin, Connecticut.—In looking over some of the published reports of the recent race at Indianapolis, I notice that the practice of buffing off the greater part of the rubber tread has become universal, as it certainly adds to the life of the tire at the extremely high speed maintained. This is claimed to be due to the better radiation of the heat from the tire.

In my estimation there is another way that this practice is of nearly as great benefit, that is in the reduction of the strain due to centrifugal force. At a speed of about 72 miles per hour the stress due to air pressure of 90 lbs. and that due to the centrifugal force is approximately equal to about 600 lbs. per square inch of fabric, making a total stress of 1,200 lbs. per square inch.

If now we remove four pounds of rubber, which in itself has so low tensile strength that it can be disregarded, we reduce the stress at least 200 pounds or 16.67 per cent. This conclusion is the result of a very rough calculation as I had no accurate data to base an exact theory upon. I think, however, that it is close enough for comparison, and as I have never seen this phase of the tire question mentioned I would like to invite criticism.

For E. M. F. Car Owners.

From W. M. Chrissinger, Iowa.—I notice in the Trouble Department of the June issue, No. 892 has an E. M. F. car and that it has developed too much play in the steering gear. I have one of the same model, 1910, and have experienced the same trouble, and can advise him how to remedy it. First I will say that his car is arranged with an adjusting screw cap at the lower end of the steering post, which, if it should become loose, would allow an end movement of the post which would in time allow considerable play in the wheel before it would affect the road wheels. If that should be the case all that need be done is to loosen the set screw in the screw cap and tighten it up until there is no end play of the steering post, which can be accomplished by turning it up tight; then back it off about one-quarter or one-half turn. Then set the set screw up tight to keep the cap in place. But if it is found that this is not the cause of the play, you will probably find that the rivets which hold the sector to the steering arm have become loose. This I found to be the trouble in my case after having run the car about 5,000 miles. In this case the steering gear will have to be entirely taken out, and in mine I found the rivets were loose, having worn until the lower end of the steering arm would move back and forth about $\frac{5}{8}$ inch. I took it to a good mechanic and he took rivets just a little larger than the old ones, and after taking the old ones out one at a time, he filed the new ones down until they drove in snug, and then with a medium weight hammer and punch he "stove" them so to make a perfectly tight fit. This took up all the lost motion. However, I will say that great care must be taken not to get them too tight, or in other words not to overdo it, for I found that the sector is almost if not altogether as hard as a file, and should the rivets be driven too tight or stoved too much, they might crack the sector or put it under such a strain

as to cause it to break when on the road. I would be pleased to hear if Mr. Knowles tries this, and if it proves to be the remedy for his trouble.

I am experiencing the same trouble as Mr. H. W. Guth, No. 889, in cranking my car, especially when it is cooled off, but I think mine is not so bad as his. If he finds where the trouble is I would like to hear from him. I have no trouble except after standing over night or for several hours, when I sometimes have to prime by putting gasoline in the pet-cock of one or more cylinders.

I trust the foregoing may be of some benefit to others.

The Two-Cylinder Reo.

From Parry T. Hersey, New Hampshire.—In your issue for June the query of Mr. Sherman, Salverson, Minnesota (No. 890), regarding his two-cylinder Reo, the rear exhaust pipe getting hot and the rear cylinder overheating, I have had some experience with these cars, and think that I can help him. See first if the water piping is clean and free from sediment, etc. Then see that the cone-shaped strainer in the bottom of the water tank is clean and strains freely. Then look to the pump. The pump wears and the ends of the teeth get so thin that the water will not pump, and then the rear cylinder, taking its water near the inlet pipe, will heat faster than the front one, which takes its water near the exhaust pipe. The pump gears will not run much over eight or nine thousand miles without renewal. I trust that this will help him to cure his troubles.

Ford Coil and Binding Post Wire.

From Harry Kent, Georgia.—In reading No. 873 in your May number I notice W. V. Moore of Virginia is having trouble with his 1911 Model T Ford car missing. I have had the same trouble with my car which is the same year and style as his car. I did everything he says that he has done and spent at least \$25 in garages trying to get the missing stopped, but could not. One day I was in Cleveland, Ohio, talking to a gentleman in a supply house about the missing in my car, and he told me where the trouble was. If Mr. Moore will have his coil taken off he will find the wire leading from the binding post is broken. It cannot get away or the car would not work at all, but sometimes it jerks away sufficient to make the engine miss fire then go back again. I had mine soldered on and it has never missed once since.

Cause of a Starting Trouble.

From F., Massachusetts.—Crabb's starting trouble is almost a duplicate of mine this spring, and your suggestion of too much gas is probably correct. My Packard suddenly got cranky after leaving the shop where it had a loose connecting rod tightened. (They dismantled the whole engine to do it; cost \$60.) After all sorts of stunts to remedy the trouble I found that a broken cotter pin that had fallen below the sliding wedge which lifts and lowers the air valve caused all the bother. It held the air valve to its seat whereas it normally should be slightly open. After removing it, there was no more difficulty.

Foul Oil in the Crank Case.

From Newell F. Reeseague, South Dakota.—Mr. W. V. Moore, 873, trouble seems like the trouble I had for a short time, that is, dirty oil in the crank case. The sediment in this was mostly metal wearings and

allows a part or whole of the current to run off anywhere it takes a notion, and the secondary wires leading to spark plugs should not touch the dash-board as this will cause some trouble in wet weather. We use this oil again after it has settled and drained for our farm machinery. About the glass gauge on the Ford, I know mine is in order by this simple method: Start the engine, give her a little spurt of speed, then look at the gauge. If oil has disappeared and then runs back again after the engine has stopped, it is all right and can be depended upon. The nature of electricity is cleanliness, and like a school boy, if there is a gap in the fence it will cut across lots and not follow the road.

Heat Is Heat.

From A. N. Henshaw, New York.—In a communication on page 73 of the June number, the term "dry heat" is used with reference to all vulcanizers not heated by steam. I have never been able to see the justification for this distinction, which is often made. Heat is heat, whatever is its source and however it is transmitted. If a steam vulcanizer gets too hot, which is sure to happen if pressure rises above a certain point, the tire is burned just as it would be on an overheated electric vulcanizer.

I may add that for a number of seasons I have mended punctures and small cuts on my tires with a Shaler D electric vulcanizer, and so far as I know, have never yet burned a tire. The temperature of the Shaler Model D is controlled automatically by thermostat, and never varies after the thermostat has begun to function. This is my personal experience with that type of machine. I believe that far more tires are injured through carelessness on the part of operators than from defect in the vulcanizers used.

Suppose a succession of cuts or punctures occurs nearly on the same place, how many times can a small vulcanizer be applied without over-cooking the rubber?

Simple Remedies Usually the Last to Be Tried.

From H. L. Dessar, New York.—I note in the June issue a number of inquiries as to why certain of your correspondents have difficulty in starting their motors, and others are troubled by missing in one of the several cylinders when the car is on the road.

Perhaps my experience may be of profit. I recently purchased a 1910 Mitchell, Model T, equipped with the carburetor that is supplied by the manufacturer. I also experienced great difficulty in starting the motor, and when running the car on the road and throwing out the clutch, the motor would race and generally stall. Also when ascending a steep grade or going over 20 miles per hour, there was a misfire in one or more of the cylinders. I ascribed all this trouble to the carburetor, and installed a Model B, Stromberg on the car. This remedied all the above described irregularities excepting the hard starting and an occasional miss when the motor was under heavy load. This puzzled me for some time until recently in looking over the motor I decided to put in new sparking plugs. On starting the motor thereafter, I was surprised to have it ignite the charge on the second quarter turn, and have had no more misfiring under any conditions. The plugs I removed looked all right nor could I find any defect in them, but—the reader can draw his own conclusion.

A friend recently consulted me with reference to a mysterious miss on his six-cylinder Winton. On looking over his car I noticed that the secondary wires from the distributor on the magneto to the plugs, had cracks in the insulation in several places. I suggested that

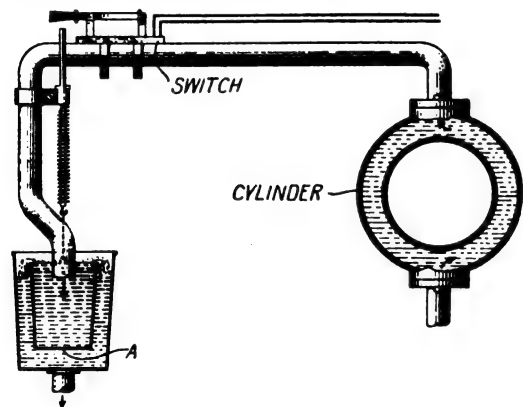
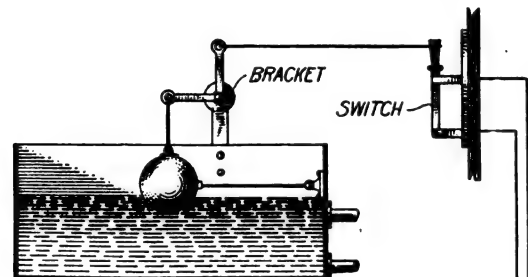
these cracks might be the cause of the misfiring by allowing the high tension current to jump through the broken insulation to some part of the frame or motor. However, he would not agree with me as he claimed that there was no miss on a speed of 15 miles or under and the trouble only showed on hills or a high speed. However, after he had exhausted his resources in trying to locate the trouble, he decided to tape up the breaks in the insulation of his secondary cable, and he now finds that his motor runs regularly on all grades and at all speeds.

I have found that in most of the troubles with the modern motor the real remedy is so simple that it is generally the last one to be tried.

To Prevent Overheating.

From Reader, Indiana.—A device for preventing overheating of the motor of the water circulation fails may be made two ways by inserting a safety switch in the ignition system circuit. On the thermo-siphon system of cooling, it requires only an extra switch, a block of wood for a float, some wire and an L-shaped piece of metal. The first sketch shows how it makes a break in the circuit when the water falls below the required amount.

For engines using forced-feed circulation from a low water supply the safety switch can be installed as shown



Wiring and Switch Connections.

in the second sketch. This requires an extra switch, an old curtain-pole spring with the wooden rod in it, a sheet-metal clamp to hold the spring, and a small pail. A larger pail to receive the overflow from the small pail is connected to the return water pipe as shown. In the bottom of the small pail there is a hole, A, one-quarter the diameter of the outlet on the pipe. As long as there is plenty of water the small pail will overflow and hold the pail down, but when the water fails to run, the small hole will drain the pail, the spring will draw it up, and the small rod inside of the spring will make the break at the switch. A small nail driven in over the clamp will keep the pail from stopping the flow of water through the pipe below.

When adjusting the small pail upon installation, it

should be filled with water and the hole in the bottom plugged until the right adjustment is reached. When starting the engine, pull the plunger rod in the spring to one side of the switch. The flexibility of the clamp will allow this to be done.

The Loose Steering Post.

From S. S. McPibben, Iowa.—I notice in your June number that one J. A. Knowles of Maryland wants to know how to take the slack out of an E. M. F. car steering post. You say that you are of the opinion there is no way to remedy the same. If he will look on the bottom end of steering post he will find an eccentric washer held in place by a set-screw. If he will loosen and turn to the right a little he will have no more trouble. I think if it does not take enough of the play out he can take off the casting from the bottom of steering shaft and he will find another eccentric on the cog wheel that works in the shaft proper and cam shaft.

How He Destroyed the Rattle.

From E. T. B., Oregon.—I have a 1910 Model T Ford and have had the same trouble as No. 913, with a slight rattle when running above 20 miles per hour, and found it to be in the front radius rods where they are fastened to the fly wheel case with a ball and socket joint. This becomes a trifle loose and causes a slight rattle. I loosened the two bolts which hold this in place and put a bushing of sheet copper around the lower side of the ball and screwed the screws up tight again and this rattle entirely disappeared.

His Remedy for the Rattle.

From Dr. F. H. Fleege, Illinois.—Dr. A. D. Grant has trouble with rattling when his car is running 23 to 30 miles per hour. Probably there is no grease in the speedometer tube, or due to the chain in the speedometer tube. I think if the tube is filled with hard grease the trouble will be remedied. Then again it may be due to the speedometer wheel. Try readjusting it and put on hard grease. I have a car like his, and remedied all those troubles myself, and now have no trouble.

THE NEW HUDSON.

A High-Class, Up-to-Date Car at a Moderate Price.

The motor of the new Hudson "37" has four cylinders and is far more powerful and simpler in design than any previous motor of this company. Nothing has been spared in material and workmanship in making a motor that will withstand the strain and severe abuse to which all automobile motors are continually subjected.

The cylinders are cast en bloc, $4\frac{1}{8}$ inch bore by $5\frac{1}{4}$ inch stroke and develop 37 h.p. at 1,500 revolutions per minute.

Lubrication.—The motor is lubricated by a constant level splash system, with reservoir beneath the crank case. A new type of pressure distributing plunger pump, operated by the cam shaft, furnishes oil to the front and rear bearings regardless of whether the car is going up or down hill. The oil, before being fed to the motor is strained to avoid any undesirable substance getting in the bearings. A pressure gauge on dash marked "Oil Pressure" indicates that oil is circulating.

Carburetor.—The motor is equipped with special carburetor, built especially for this motor. It was adopted after exhaustive tests. This carburetor is equipped with a dash strangler to facilitate starting in cold weather. The gasoline is fed to the carburetor under pressure

which insures constant feed and eliminates the trouble of gasoline not reaching the carburetor when going up hill.

Ignition.—This system furnishes a dual ignition with magneto type of spark for ordinary running, and dry battery ignition in case of emergency. This system is controlled by a patented Delco Kick Switch placed at a convenient place on dash within reach of the driver.

Starting.—The motor is cranked and started by electricity, thereby doing away with the necessity of the starting crank. A detachable starting crank is furnished for use in timing gears or doing other work on the motor.

Lighting.—All lamps can be lighted directly from the generator or from the storage battery. A small lamp is also placed on dash to read the gauges at night. This light is on the same circuit with the tail lamp and should this go out, the driver will be notified by the dash light being out.

Clutch.—This is of an improved noiseless disc type, self-contained in an oil-tight case which is a part of the flywheel. All discs are made of steel stamping. The driving discs have cork inserts. The clutch runs in a mixture of half oil and half kerosene which prevents grabbing and permits freedom of action when released.

Transmission.—This is of the selective type, three speeds forward and reverse with direct drive on the third speed. The transmission is bolted to the rear of the motor, making a unit power plant. Gears are cut from special steel and hardened, having very strong teeth and wide face. Large sized roller bearings are used throughout. They are mounted in malleable iron cages which prevent them from working loose in the aluminum case. They can also be easily and quickly removed. All gears and bearings are kept running in oil. There is no oil leakage.

Driving Shaft.—The power is transmitted from the transmission to the rear axle through a propeller shaft and two universal joints. It is of nickel steel. It is heat treated. The universal joints are extremely strong. They will withstand all the work imposed on them. They are made of special steel, hardened and ground. The front axle is a one-piece drop forging from special steel. It is heat treated. The wheel spindles are also of special steel, heat treated and ground, and are of ample diameter to carry large size roller bearings on which wheels are mounted. Two phosphor bronze bushings are pressed in each of the spindles and reamed in place to have a bearing fit on the king bolt.

Rear Axle.—It is of pressed steel and is full floating. Each end of the axle carries two roller bearings on which wheels are mounted. The whole load of the car is carried on the axle itself and not by the driving shaft. A torsion arm relieves all strain from the end of the transmission shaft and universal joint.

Brakes.—Double brakes are placed on the rear wheels. These are of 14 inches in diameter and 2 inch face. The foot brake is of external contracting type. The emergency brake is internal expanding. Both brakes are lined with special non-burnable lining.

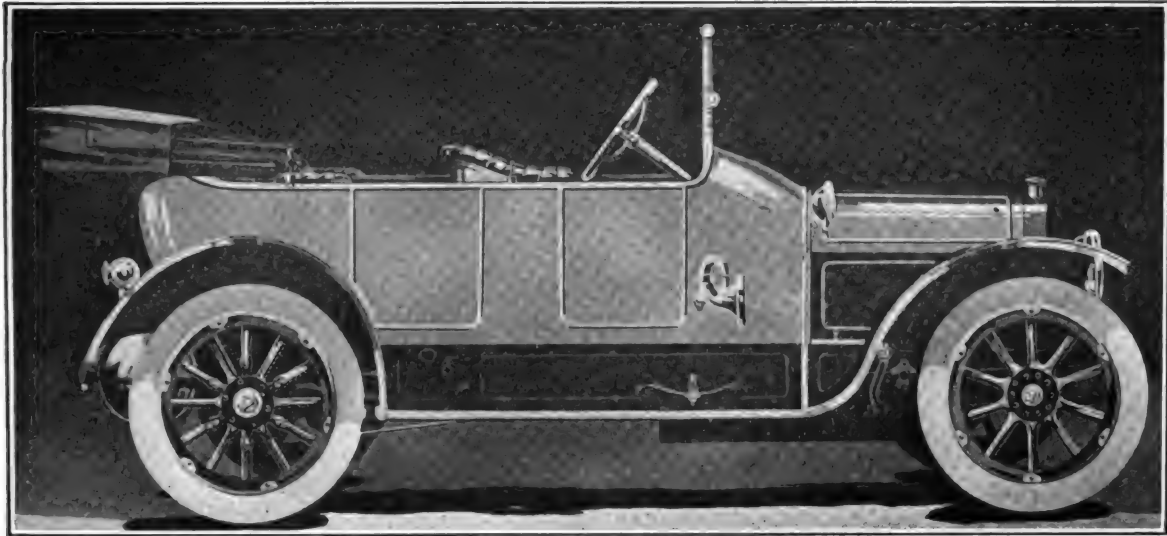
Wheels.—They are of the artillery type, the strongest used for automobiles. The spokes are $1\frac{1}{2}$ inches in diameter and are made of second-growth hickory, thoroughly seasoned. Ten spokes are used in front wheels with ten hub clamping bolts. Twelve spokes are used in the rear wheels with twelve hub bolts. Wheels are fitted with 36x4 Demountable rims, which take Quick Detachable clincher type of tires.

Frame.—This is the life of the chassis and for this reason special care has been taken to construct a frame to withstand the variable strains to which it is continu-

ously subjected. The side members are of one piece pressed steel, heat treated.

Springs.—The springs are designed to make them ride easily and comfortably. They are made flexible by the use of a large number of thin leaves, scientifically oil treated, instead of heavy and narrow leaves as is the

of heavy gauge pressed steel. A gasoline gauge is placed on the tank showing at all times the amount of gasoline in it. The tank is tested under high pressure to make sure that there will be no leakage in the fitting. A plug is provided in the bottom of the tank to drain the gasoline, if necessary. The pressure in the tank is regulated



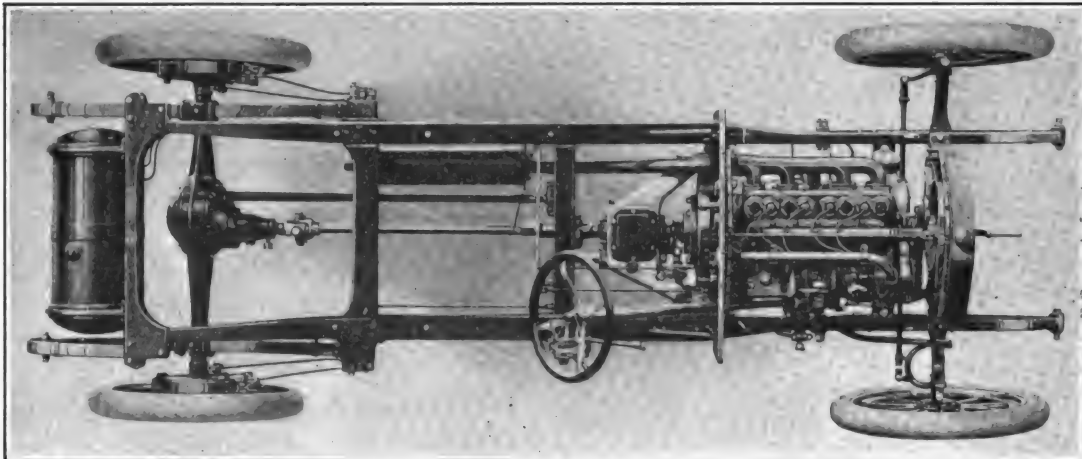
Hudson, New Model 37.

usual custom. All leaves are tongued and grooved to prevent side motion. Leaf retainers are also employed on front and rear springs. All leaves are assembled with graphite grease between them to lessen friction and wear.

Steering.—The steering is what is known as non-reversible type, which is the worm and worm-gear combination. The worm gear, which is one piece with the shaft, is a full type gear and not a half gear as is used

automatically by a new type of positively operating air pump. It is driven by the motor cam shaft. An air gauge on the dash board indicates the pressure in the tank.

This car is made by the Hudson Motor Car Company, Detroit, Mich., and those interested in a car that has earned an enviable reputation for reliability, low cost of upkeep and of high-class construction should address the firm for further particulars.



Chassis of the New Model Hudson 37.

in many cars. This construction is more expensive, but was adopted in order to provide an adjustment in case of any wear that may be experienced with long use. Worm and worm-gears are cut from special steel and hardened. The gears run in soft grease which may be easily added through a special dust-proof cover provided for the purpose.

Gasoline Tank.—This is placed on the rear of the frame where it can be reached more easily than elsewhere. It is held in place by two strong leather lined brackets. The tank holds 22 gallons of gasoline and is

Where linoleum is used as a floor covering for cars, a coating of linoleum cement applied once a week or at slightly longer intervals will insure its practical indestructibility.

Boost the good roads movement. Good roads greatly increase the utility of the automobile.

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Automobile Dealer and Repairer

A Magazine of condensed and compact information for busy readers.

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NEW YORK, JULY, 1912.

Missing Numbers—Our Readers are requested to remember that it always gives us pleasure to re-send numbers which have gone astray in the mails.

The Automobile Dealer and Repairer in Australia and New Zealand.

Mr. R. Hill, Matlock House, Devonport, Auckland, New Zealand, is our accredited representative in Australia and New Zealand for obtaining new subscriptions.

AN IMPORTANT EVENT.

The American Road Congress, to be held in Atlantic City, from September 30 to October 5 will undoubtedly be the most important event of the kind ever held in the United States. It will mark the consolidation of forty of the most important road organizations of the country, and will include the American Automobile Association. Every industry relating to the building and care of roads and bridges will be represented, and it will be possible for the road builders and road users to acquaint themselves fully with all the labor saving devices, methods and formulas of American ingenuity and inventive genius. From Quebec and intermediate points will come a great contingent of good roads enthusiasts who are striving for a great international highway stretching from Quebec to Miami, Florida, traversing the entire American seaboard. These will be met at Atlantic City by the southern boosters who will come from Miami and intermediate points. The arrangements for these tours will be under the direction of the American Automobile Association and the American Association for Highway Improvement.

The program is an unusually good one. That is to say, not much time will be wasted in setting forth the need of good roads, but the main thing will be to take steps to get them. Talk of the need of a thing is well enough until the need is clearly seen, but from that time on, talk until doomsday will not amount to anything. It was generally agreed in Paris that the Bastille was a disgrace, but it would be standing today had not the mob finally set up a shout: "We will have the Bastille." Then it came down. There is no question before the people today that so intimately concerns their material welfare as that of good roads. We can and must go slow in certain public expenditures; concerning some of them, the benefits may clearly be in relief or support of a class, but not of a sufficiently large class to warrant taxing all to promote them. But good roads will benefit

every man, woman and child in the country, rich, poor, high, low, city man and country man, home, mart, factory and farm.

It is gratifying then to know that something practical is to be accomplished at this convention. The first two days will be assigned to the road users under the auspices of the American Automobile Association, the second two days to the great problems of legislation, finance and economics under the auspices of the American Association for Highway Improvement, while the last two days will be given up to the engineers who will discuss problems of construction and maintenance, and to the various associations which will meet and map out their plans of action, correlate their efforts, and make definite arrangements to pull together in the greatest campaign for road improvement ever undertaken.

AUTOMOBILE COLLISIONS.

Some of the worst accidents of the past month have been the result of collisions between two cars coming either in opposite directions or at right angles.

The lesson is obvious, but it is really the same as in the case of most other accidents; it enforces the need of more care in driving. When two cars are being driven by men who are each reckless, the chance of a collision in passing is by no means remote. When each holds the idea that "a miss is as good as a mile" the miss is at any time liable to precede a disaster. Possibly the writer has had unusual experience—encountering more than his share of the whiskey laden parties that are naturally found in the suburbs of a great city—but he has again and again passed automobiles where if they had not been given more than one-half of the road, a collision would have been inevitable.

Carelessness may be indulged in while driving horse-propelled vehicles with some degree of impunity. The horse has often better sense than his master. In meeting another team he will usually pull out to one side whether he be reined out or not. But the automobile, ready as it is to respond to the steering wheel, and impossible as it is to take any course other than which it is guided, is as much more insensate than the horse as the thick-headed or muddle-headed automobile driver is more than the horse.

In several instances there have been collisions of two cars approaching at right angles. Sometimes the blame seems to have been entirely due to one driver, but more frequently both have had a share in it, for one careful driver is usually able to escape a reckless one.

In approaching a turn in the highway or a cross highway there is no safety, so long as the recklessness of others exists, except the utmost vigilance and the assumption that the recklessness is liable to be encountered at any time.

LIFE OF AN AUTOMOBILE.

That much discussed question, "What is the length of life of an automobile?" is not quite as absurd as the slang query, "Why is a hen?" but it is surely as hard answer as "What is a yard of cloth worth?"

The reason why we see so few primitive cars in use is due to the fact that they are so much inferior to recent models that it does not pay to use them even though they are as good as they ever were.

There have been wonderful improvements made in the automobile within the past six or seven years, and today no one cares to run those of the earlier period except it be purely from motives of economy, and in most instances their use and maintenance is an extravagance rather than an economy. Compared with the

earlier models the car of today is a marvel in power to pounds of weight, in reliability, in simplicity, in freedom from vibration and in fuel economy.

There has just been retired to a motor museum in London a Panhard car made in 1891. This car has been until the past few months in constant use by an abbé in France. It chug-chugged and puffed and blowed along with him for 21 years. Of course he used it well even though it made his poor bones ache, and possibly tried his religious patience. It is no more like the car of 1912 than a modern trotting sulky is like the wagon our blessed forebears used on the farm.

But from now on improvements will be fewer and far less revolutionary. Most of us now know just the kind of a car that is needed, and most of us likewise know very little of the difficulties, and in some respects the insurmountable obstacles, in the way of its production.

"MANIA" THE CORRECT WORD.

Of course high speed driving may be correctly termed a mania, with all the shades of meaning the word implies. It is true there may be occasions when high speed is reasonable and necessary, as in the case of a call of a physician in haste, and in rare instances, the necessity of keeping an imperative appointment. But accidents are rarely due to such cases.

In nine cases out of ten accidents proceed from pleasure driving purely; we do not say "joy riding," because that opprobrious term in popular parlance has a somewhat different meaning and is usually criminal or vicious, *per se*. But singularly enough—and this clearly indicates that fast driving is a mania—some one starts out on a ride for pleasure, and instead of making the pleasure lasting, he seems to try to make it as short as possible. It is as if one were to make an attempt to put down a good dinner so rapidly that he is in constant danger of choking himself to death.

Now if there be any pleasure in riding at all, it is increased by riding at moderate speed. It must be worth something to know that if a tire bursts no one's life is endangered, to know that a valuable self-propelled vehicle is not being ruined, that others are not being subject to the risk of being run down, and that moderate speed presents a far more pleasing spectacle to the observer than reckless speed. Then again, if the surrounding country is in any way attractive, it is worth something to enjoy it.

That speed has its attractions goes without saying. But with the Titanic horror as a fresh object lesson of reckless speed, and the reports every day in the press of maiming, loss of life and the destruction of valuable property, the prevailing tendency for dangerous driving—of driving on a public and ungraded highway as fast as a locomotive is usually speeded on a private and graded track—cannot be appropriately termed except by the word "mania."

NOTHING TO DO WITH THE CASE.

Isn't the "high cost of living" cry as unreasonable as it is monotonous as applied to hard times? In point of fact, the cost of living has very little to do with good times or bad times. The writer of this was in Alaska when the price of meat was \$2.50 a pound, eggs were \$1.50 each, women's and men's clothing was \$75.00 for suits that sell in New York today for \$7.50 each, and everything else in about the same proportion. Yet there were no hard times there and no poverty. We were in Porto Rico when the weekly food bills for a moderately sized family were from 25 to 50 cents, and yet three-

fourths of the people were absolutely poverty-stricken and living from hand to mouth.

The object lesson of the civilized world is that high cost of living is accompanied by widely diffused prosperity, and low cost of living by widely diffused poverty.

The cost of living is higher than it was, but it has brought no soup houses, no bread lines, no Coxey Tramp Army marching to Washington. When such indications of distress appear, then let the cheek blanch, the blood surge, the heart thump, the conscience cry out; let pity flood, let philanthropists put their hands in their pockets, let statesmen sweat, let the press agitate.

Now we are not going to iterate the outworn, exasperating and canting phrase: "The poor ye shall always have with you," because preventable poverty is civilization's crime. But when the "high cost of living" has not brought anything like the odium of the soup house and the disgrace of the bread line it need not worry us much.

Here in this city of New York we notice that the grand stands and the bleachers of the baseball fields are full, that the hundreds of moving picture shows and theatres are packed, that the nearby beaches are crowded, that the saloons and soda fountains thrive. Out in the country districts the farmers are studying the automobile catalogues and writing us letters asking advice as to what kind of a car will best supply their needs. According to reliable reports they are buying cars in California at the rate of 50 a day.

"So you think everything is all right," we hear some reader remark. No, we reply; not by any means. Things are never all right as long as there is a chance of improvement. We have no patience with those who turn their faces from the bright sun of progress and prate about the hard condition when they "were boys." That has nothing to do with the case. The world moves forward, not backward.

We hung witches and believed in demonology 200 years ago; we roasted on one side in our homes and froze on the other; we wore our shoes "to meeting" but took them off to save them as soon as we were out of sight of the church; we toiled long hours and ate coarse food and wore coarse clothing. Two hundred years ago in England little creatures of six years were thought fit for labor—so Macauley says—the workers lived mostly in dugouts, while the dames of wealth kissed and shed tears over Claude Duval, the murderer and robber. Thus we have improved morally as well as materially.

Things are far better now than they were 200 years ago, or even 50 years ago, and we want them to be as much better in 50 years to come and in 200 years to come, as they are now better than at the former periods.

But "the high cost of living" has absolutely nothing to do with good times or bad times, and it is well enough to occasionally look at things from the right view point. The cost of living has gone up somewhat faster than fixed wages, it is true, and when it goes down it will likewise go down faster than fixed wages.

THE WHOLE ROAD.

Some one writes to a New York newspaper that he will not purchase an automobile as long as the laws against fast driving are so lax. He feels that although he himself may always drive discreetly, his life will be in constant danger when on the highways owing to the recklessness of other drivers.

There is some excuse for this feeling. The discreet and considerate driver need never fear an accident if he never encounters a careless and inconsiderate one. It may not be the case in some other localities, but

around New York City about the only safe plan is to assume that no approaching car will give half the highway in passing. It is true that not one in fifty will fail to give room under such circumstances, but that one may be the cause of a costly and perhaps a fatal accident.

Now we do not claim that as large a proportion as even one in fifty is careless or indifferent, but when to this proportion is added the "high-ball" befuddled, the estimation is not far out of the way.

Quite likely the writer may be just a bit pessimistic in his view of the situation, but present conditions of safety are not what they should be, by any means. Nor can we see how they can be fully remedied by legal measures. When you are passed at the rate of 40 miles an hour by some reckless driver who strikes some part of your car because he did not give you half the road, it is not an easy matter to bring him to book. Even if you turn about, overtake him and cause his arrest, his word in a court of law may be just as good as your own, and if he has one more witness than you have, it is a little better.

We see no way to remedy the evil but the widening of the highways, or as stated, giving every approaching car practically the whole road.

LESSONS FOR DRIVERS.

Carelessness and Ignorance Responsible for Most Accidents.

Probably owing to the fact that motoring has been at its height, never have so many shocking automobile accidents been reported as during the past month. Almost every conceivable cause figured in them, but in nine cases out of ten they were due to careless driving, although in rare instances, they were caused by neglect to go over the car to look for something wrong before starting out on a trip.

We want to call attention to the tendency of many drivers to constantly increase their speed so long as nothing befalls them. Many begin driving slowly. As they gain experience and knowledge, becoming expert drivers, they naturally increase their speed. Owing to the uncertainties of the law of chance, they drive at high speed for some time. Then they become possessed with the idea that they are equal to any emergency and that an accident is improbable if not actually impossible as long as they are at the wheel. The condition is something like that of the man who goes down into Wall Street to speculate. Being favored by the law of chance, he makes several transactions and each one is profitable. Then he invariably—and possibly quite naturally—gets the idea that stock speculation is easy and about the best method of making money there is in the world. It is true, he hears of the losses of others, just as the car driver hears of the accidents of others, but he has got the idea that as long as he follows his own plan it is next to impossible that he should lose. By and by, he suffers a loss, and if it be a big one, it often serves as the best lesson he could learn. It is the same with the lucky car driver. That confidence, born of the fact that he has never had an accident, spurs him to drive faster and faster until by and by the inevitable accident occurs. If this be particularly fatal or afflicting, he may declare in his sorrow and remorse that he will never drive or ride in an automobile again. But if it be a narrow escape, good luck having attended him, it may be the best thing that can happen. He will be a far more discreet driver in the future. There is only one absolutely safe rule to follow: Never take chances, and never try

to see how expert you can be. Appended will be found a few of the hundreds of accidents reported this month.

Accident to a Family of Eight.—In Paterson, N. J., a family of eight persons were hurled against the front of a trolley car and all were more or less injured. Three of the children have fractured skulls and the adults are all dangerously injured. Seeking to pass a street car the driver of the automobile turned sharply and ran into another trolley car. The automobile was reduced to splinters and the tremendous shock caused two women to faint. The accident was an awful one but no one is to blame except the driver of the automobile.

Steering Gear Breaks.—Following the breaking of the steering gear on his car, the driver lost control of it near Binghamton, and it plunged over the bank of the Chenango River. The driver went with the car into the water, being thrown over the wind shield where the water was not deep enough to drown him. As a result he got only a bad ducking and a severe shock to his nervous system. The car was pretty well smashed up, however.

Said to be Going Sixty-five Miles an Hour.—Near Poughkeepsie, N. Y., a six-cylinder car in which were three young women and nine young men and going, it is reported, at the rate of sixty-five miles an hour, smashed into a telegraph pole. One man was killed, and the other occupants seriously injured. The car is supposed to accommodate only seven passengers but the driver who was killed, asked the entire party to get in. He had said that the big drivers at Indianapolis "have nothing on me," and the party started off singing gaily, but a sandy hole in the road twisted the car so that it struck a telegraph pole with a fearful shock. It was about as severe a lesson to joy drivers as could possibly be conceived.

Ran Off a Bridge.—Near Cedar Rapids, Iowa, two people were probably fatally hurt and five others more or less seriously injured when a car ran off a bridge and over a twelve foot embankment into the river.

Thrown Into the River.—A large touring car ran up one of the trusses of a bridge near Utica, N. Y., hurling its five men passengers into the stream below. After the car had shot to the top of the six-foot arch, it toppled back upon the sidewalk below, and when found was tightly wedged between the truss and hand-rail of the bridge. Just how the accident occurred is not known. The car was not going with any great rapidity but it suddenly made a turn, and before it could be righted, its momentum was sufficient to send it up the incline, and to throw the occupants into the stream. None of them were killed, and in fact all escaped with less injuries than would have been expected. Evidently this was due to the fact that they were all shot out of the car.

Car Struck by a Locomotive.—In Cleveland, Ohio, the driver of a car approached a railroad crossing but did not see a switch engine until it was too late to stop. It struck the car squarely and hurled it out upon the bank of a canal. The three passengers were all more or less injured, although none fatally. Had the car gone five feet further, they would all have been drowned.

The Deadly Crank Again.—In Norristown, Pa., a man sustained a fracture of the right wrist when the crank suddenly reversed. The fracture is a serious one. At Walden, N. Y., a man is likewise nursing a broken arm because the motor suddenly back-fired, the crank striking him a vicious blow on the arm, and snapping the bone like a pipe stem.

Another Railroad Crossing Fatality.—A clergyman

and a woman, supposed to be his wife, were killed and the chauffeur probably fatally injured when the car in which they were riding was struck by an engine near Paterson, N. J. The woman had a bull dog in her lap which was also killed. The engineer is said to have blown his whistle when approaching the crossing, but evidently the victims were too much engrossed to hear the sound.

Just a Bad Stretch of Road.—Two men were injured when their car turned over because it struck a bad stretch of road at Salamanca, N. Y. The wheels got into a deep rut, and the car was overturned. The passengers were cut and suffered bruises and broken bones.

Seven Persons Under a Car.—Near Geneva, N. Y., a car containing seven persons turned turtle and buried all beneath. Three adults were severely injured, but the children escaped with a few bruises. The driver was touring down the road and was about to make a short turn when he accidentally put his foot on the accelerator, which increased the speed of the machine. At the same time, he lost control and the car turned the corner at a rate of speed said to have been about thirty-five miles an hour. Before the driver could regain control, the car ran off the embankment and turned turtle, burying all of the occupants underneath.

Four are Dying.—At last accounts four are dying near Paterson, N. J., as a result of a collision of an automobile and a street car. There were five or six in the car and the driver attempted to pass a northbound trolley car which was stopping directly in front of his machine. He pulled to the left and being in the driver's seat to the extreme right of the machine, was unable to see the southbound car bearing down upon him. The car struck the radiator of the auto head on, reducing the vehicle to a mass of twisted iron and debris. Willing workers soon had the injured ones in a hospital, but a mother and her three children will probably die.

Struck By a Locomotive.—Near Poland, N. Y., a car containing four persons was struck by a locomotive and three of them were killed. The rear end of the automobile was caught by the train and the machine was hurled a distance of 30 feet, all the occupants except one being thrown out. Parts were carried a distance of 300 feet and the occupants of the car were hurled in various directions. One of the women is said to have been found enveloped in the top of the machine. The crossing was known to be dangerous and the Utica Automobile Club have posted danger signs on each side, in addition to the usual railroad signs.

What Becomes of the Old Automobiles?

The Maxwell-Briscoe Motor Company has obtained sworn testimony and declares that their old cars are still running—or able to do so. In offering gold medals to all Maxwell owners who have driven 50,000 miles, the company received thousands of applications covering almost every Maxwell that has been built. Many applicants failed to comply with the rules but their affidavits showed that cars which were thought to be out of service are still running the same as ever.

When the 55,000 Maxwell cars are subjected to the same rule of proportion as was applied to the statistics in the club affidavits, the answer was found to coincide very closely with the official records of New York State showing 91 per cent. of the seven-year-old Maxwells still in use.

Don't neglect to re-grind the valves of your engine whenever they show the least signs of leakage.

LUBRICATION PROBLEMS.

The Various Systems and Requirements and the Difficulties Encountered.

(Address by A. E. Potter before the recent National Gas Engine Convention at Milwaukee, Wis.)

There are three all important essentials that insure the satisfactory operation of every gas engine, viz.: economical and even carburetion; regular and dependable ignition, and efficient lubrication. No matter the style, design, type or construction of the gas engine, the fuel must be carbureted and then ignited, and if to run satisfactorily the engine must be lubricated.

With faulty carburetion or defective ignition, very little damage to the gas engine itself can result, but if the lubrication fails in any one point or part, the necessary repairs or replacements may often entail a cost equalling a considerable percentage of the original cost of the installation, to say naught of loss sustained from a possible shut-down.

Every gas engine designer, manufacturer and operator, who will give the subject careful thought and consideration must admit that the problems of efficient, sufficient and deficient lubrication are about the hardest he is called upon to solve. Efficient lubrication is by no means analogous with sufficient lubrication, for one might use twice or thrice the quantity of oil necessary and the efficiency loss would be greater and sooner the apparent, as a result of deficient lubrication.

Again a gas engine may have sufficient lubrication at all moving contacts except a single, obscure, hard-to-get-at or forgotten point, and the entire lubricating system structure fails, no matter how simple and inexpensive or how complicated and resultingly costly.

My ideal of perfect gas engine lubrication may never be attained, no matter whether used in gas engines for motor cars, motor boats, motor cycles, aeroplanes, tractors or for stationary use, for there are some extremely weighty problems that today confront the theoretical designer, practical manufacturer and more or less (usually less) well-informed owner, salesman, and user. It is my purpose to present for your consideration, discussion and criticism some of these problems.

Were some of you practical gas engine men to recount a few of the lubrication troubles you have yourselves experienced and encountered, some of them now simply and easily explained and others still clouded in mystery as to why they happened, it would, no doubt, be extremely interesting.

Years ago before the arts of carburetion and ignition were so well understood as today, to these two essentials were ascribed practically all the troubles incidental to the operation of gas engines, and to surely avoid the hidden shoals of faulty lubrication which might be encountered, it was customary to feed the gas engine about all the oil it would take, and then some. As a result the usual condition of the gas engine closely resembled that of the "gurry" tank of a menhaden oil factory, fortunately, however, without its refreshing (?) odor.

Lubrication problems are broadly divided into two classes, first the apparatus and act of applying the lubricant, and second, the lubricant itself.

Applying the Lubricant.

The principal parts of a gas engine to be lubricated, in order of their importance are as follows: Cylinder, piston and rings; crank pin; wrist pin; main bearings; cam shaft bearings (if the engine is four-stroke-cycle); and the outside reciprocating and rotating parts.

These may all be easily lubricated or relatively hard to reach with lubricant, depending largely upon the de-

sign, type, construction, size, etc., also for what purpose used, and the care ordinarily received at the hands of the operator.

There is probably no simpler and easier gas engine to efficiently lubricate than the little horizontal four-stroke-cycle, thousands of which are being manufactured and sold annually, their use being extended to include almost every conceivable purpose, under good, bad and indifferent conditions, more often of abuse rather than use.

In these engines every part is easily get-at-able, and if the sight feed oil cups are kept filled with good, clean oil that will flow freely, little or no trouble may be feared from faulty lubrication, and if trouble should begin to develop, for instance a suspicious heating of crank or wrist pin bearings, or of the main or cam shaft bearings, or the piston should start to squeak, it is a simple matter to prescribe and administer an extra dose of oil and effectually squelch the cause of the incipient trouble forthwith.

Stationary four-stroke-cycle horizontal motors are proverbially readily lubricated, even if in units of several hundred horsepower, for all their reciprocating and revolving parts are within plain sight and feel. In the larger units ring oiling devices will care for the main bearings, the crank pin will get its quota of oil from a wiper on the crank pin brasses or cap, the cylinder, piston and rings are cared for by a sight feed lubricator that requires filling but twice in ten hours, and small cups will lubricate cam shaft bearings and moving igniter parts. When starting the motor in the morning it is necessary but to fill all cups, and note that they are feeding their usual amount, after which little attention need be paid to the gas engine until quitting time at noon. Afternoon runs are but repetitions of the morning operation, and the last boy or apprentice to be employed is quite often the "chief," as the engineer is usually styled.

Vertical four-stroke-cycle stationary engines require considerable more care in the matter of lubrication however, and for various reasons, some of which we shall consider.

First the piston must be a closer fit else it will start to pound and move from side to side in the cylinder as the power stroke succeeds the compression stroke. While in the horizontal engine the weight of the piston and connecting rod holds it against the lower side of the cylinder bore, their weight is now borne by the crank pin, and it has to carry at least their combined weight almost continually. Some times to reduce this weight a part of the lower end of the piston may be sacrificed and a lubrication problem begins to "loom up" on the horizon. It is barely possible that the oil port is too high, or that there is a leak past the upper piston ring and the oil will not feed from the gas engine gravity feed lubricator, or it may feed until one-half is used and then the flow ceases. In some cases in the anxiety to shorten the piston no allowance is made for a temporary uncovering of the oil ports at the end of the up stroke and the oil is pushed away by the piston on its down stroke, as it flows freely when the port is uncovered. If there is a deficiency of oil for lubricating the cylinders, pistons and rings, there will probably be an insufficient quantity for the proper lubrication of the wrist or gudgeon pins. To prevent the oil from being splashed all over the engine room the crank shaft is usually enclosed. While it is easy to watch the outer or exposed main bearings for suspicions of heating, it is only by stopping the engine that the crank pin and possibly center main bearing can be inspected, to assume of their being properly lubricated.

These are but a few of the lubricating problems present in a vertical four-stroke-cycle engine that one is not called upon to solve in the operation of horizontal gas engines.

If the designer has been able to a certain extent to overcome the possibility of some of such trouble as I have mentioned, he has solved a few that the operator will not be called upon to solve. None of these troubles is at all improbable, and the thorough gas engine man is always on the qui vive or lookout for any one or all of these happenings, separately or combined.

I consider it more difficult to properly lubricate the wrist pin of a vertical gas engine than any other part. It is not unusual to read descriptions of lubricating systems where the oil is caught in pockets, conducted to the wrist pin bearing, then through ports in the hollow wrist pin to the walls of the cylinder. Could anything be much more unreasonable? Pressure is constantly, or at least at every explosion, leaking more or less past the piston rings, and if the wrist pin is hollow as it should be, sufficient oil should be conducted from the walls of the cylinder to the wrist pin bearing. This is not such a difficult job as one might think, provided holes are drilled from the bottom of the lower of the series of ring slots above the piston pin, to conduct the oil into the hollow pin, which can have its ends partly plugged to retain it. I also maintain that every vertical gas engine piston should have a ring at its lower extremity, or a series of narrow grooves, similar to the water pack used on water pump pistons, to create a pressure to force accumulations of oil to the wrist pin bearing, oil that might otherwise get into the combustion space and deposit carbon therein with attendant evil results, or reach the crank case unused.

The next problem to be considered is the lubrication of the cylinder walls, piston and rings. Personally, I do not like "over-running" pistons, or cylinders that are so short that the pistons, on their inner centers, project into the crank case, principally in the matter of securing proper lubrication, unless a positive pressure feed is used for cylinder lubrication and the cylinders may not be further lubricated by means of dirty oil splashed by the connecting rod lower ends.

Designers of vertical engines could profit by a careful study of the lubricating systems used by foreign manufacturers of Diesel engines. Not one of them utilizes splash lubrication. Instead of this, to me at least, inefficient method, all parts are positively and accurately lubricated by means of measuring pressure pump systems, the surplus oil being drawn from the crank case. In this system good, clean, cool oil is supplied constantly, fast if the engine is speeded up, slow if partly throttled, or the supply shut entirely off as the engine is stopped. This system does not necessitate expensive and tedious work drilling long deep holes in the crank shafts for forced feed to crank pins, and possibly through the connecting rods with a hope to get some oil there, but it places the oil where it should go, in sufficient quantities and with the utmost regularity.

At the recent lecture delivered by Dr. Diesel in New York it was stated that any kind of vegetable or animal as well as mineral oil or gas house tar, could be used with Diesel engines without leaving any residue in the combustion chamber. This fact alone might be an excuse for the over lubrication of Diesel engines as would be quite likely if splash were employed, as there could be no carbon deposit, no matter how much or what sort or quality of oil were used.

It is my honest belief that at least one-half the ordinary troubles due to faulty lubrication in vertical gas

engines are due to splash systems, used in whole or in part.

To my mind there is but one system that can be productive of more baneful results than the splash—the circulatory or flushing system. Dirty oil is taken from a sump, passed through some sawdust or waste and forced under pressure to bearings to wash out small particles of metal, dirt and grit, with which it is mixed and continually used and used with new oil added occasionally. Who of you would think he could use a pail of kerosene indefinitely in which to wash connecting rod caps, bushings, bolts and nuts exclusively? Did you ever try to filter grit and small particles of metal out of oil? If you have you must appreciate one fact in connection with forced circulatory flushing lubrication systems, that the problem of thoroughly filtering out the grit and metal particles is one for serious consideration.

Yet in spite of all this a very large majority of motor cars built and building this year are designed to use forced circulatory lubrication systems. Why? Ask the manufacturers and they will probably tell you that their agents and customers prefer this system, that it is popular this year, but outside of its popularity I see nothing to commend it.

If the clean oil forced feed system is applicable for four-stroke-cycle vertical motors why can it not be used to advantage with vertical motors of the two-stroke-cycle type? There is no reason whatever why it can not, if means are provided for removing the drained oil from engines using crank case compression without losing this compression, and to my mind this would not be a hard problem, utilizing a spring returned plunger operated by the crank case compression to transfer the oil from a sump in the crank case to a waste oil reservoir, connecting the crank case of each cylinder with such an ejecting piston pump.

It may be that my reasons for not favoring splash and flushing lubricating systems are the result of early lessons learned in connection with vertical marine steam engines, neither of which systems would any designer for an instant consider in the design of a marine outfit, nor would any engineer who was to have the care and responsibility incidental to its running, even listen to such a suggestion as the possible employment of either a splash or flushing circulatory lubricating system.

The Kind or Quality.

One of the strong arguments in favor of the system that I have heretofore described has to do with the choice of lubricant to be used.

Today there are very many able gas engine authorities who would not countenance the use of any but a so-called Pennsylvania oil. It might not matter if it first saw the light in Ohio, Illinois, Indiana, or even the mid-continent oil field of Kansas or Oklahoma, so long as guaranteed made from Pennsylvania crude petroleum. There are others who would not think of using any but an oil made from petroleum with an asphalt base, such as is being largely produced in California, Texas, Oklahoma and Kansas. I do not intend at this time to enter into any discussion as to the relative merit or qualities, good, bad or indifferent, possessed by either paraffine, semi-asphaltic or asphalt base oils.

The fact that all excess of oil is burned up clean in Diesel engines leads one to think that perhaps many of us, under certain conditions, are using oil with too high fire test. I recall that some 18 years ago I ran a double-cylinder 6 h.p. Globe marine gasoline engine with a gravity system of lubrication. In those days steam cylinder stock was used almost exclusively for gas engine cylinders, while machinery oil was carried for use

elsewhere about the engine. I found that when dark cylinder stock of high fire test was used there would be a considerable missing of explosions, and that when a filtered cylinder stock was substituted (the latter having claimed considerably lower fire test), the missing would soon cease, only to appear again as the dark oil was used. I experimented considerably then with oils and found that with a thin oil such as was used with Murray & Tregurtha marine gasoline engines, it would not take so many cells of battery to ignite the charges of gas, and that I was really able to run the engine faster than with the higher fire test oil. This was the first light bodied oil I ever saw designed for use in gas engine cylinders. As I remember it was about the consistency employed nowadays for ordinary summer motor car use. Just what its composition was I do not know, but I judged it to be composed largely of some neutral light colored spindle oil compounded with light filtered cylinder stock. This improvement in the action of lubrication was so marked that it made a strong impression upon me, and from that time on for many years I advocated the use of thinner oils, but oils not so thin as to have too low a viscosity, in fact the thinnest oil that could be obtained that would do its work, even if it took a greater amount to accomplish the same results. I am satisfied that the reduced fire test of these thinner oils will allow any excess that gets into the combustion chamber, to be consumed more completely with the fuel, without residual carbon deposits and the production of smoke.

From a careful study of the situation, and the conditions existing today in vertical gas engines using both splash and positive force-feed systems, I am strongly of the opinion that a high fire test oil sparingly used, as well could be, is better adapted for positive forced-feed systems, while a low fire test oil better answers the requirements where splash systems are employed for lubricating cylinders, pistons and rings, on account of allowing for a sure sufficiently for not so positive a system, that the excess oil may be more completely consumed in the combustion chamber with the explosive gas. I therefore think that the fire test is the first quality to be considered in the selection of an oil for the lubrication of gas engine cylinders, with the exception of course of tests for excess acid, dirt, etc.

Closely allied to fire test, and of next consequence is the viscosity and this quality should compare with the heat present under normal running conditions. It would be manifestly improper to attempt to use the same oil for an air-cooled motor of comparatively slow speed, that would give best results in a high speed motor car or aeronautical gas engine.

Some brands of gas engine oils show a very high viscosity when measured on a standard Sayboldt viscosimeter at a temperature of 100 degrees F., and very low at 212 degrees, which is more nearly the usual temperature during cylinder lubrication, while other oils may exhibit a much lower reading at 100 degrees and equal or even higher relative readings at the higher temperature. Quite naturally an oil of 350 degrees fire test, giving off volatile vapors at probably 300 degrees would not show at 250 or 275 degrees the viscosity that an oil would with a fire test of 450 degrees and a flash point of some 50 degrees less, and for this reason the higher fire test oil would be undoubtedly better adapted, other qualities being equal, for the lubrication of air-cooled gas engines, than an oil of lower fire test.

The specific gravity or weight of a gas engine oil is of use mainly to determine whether the petroleum for which it was produced had a paraffine, semi-asphaltic

or asphaltic base. Petroleum with paraffine base is found principally in the States of New York, Pennsylvania, Ohio and West Virginia, while all petroleum found west of the Mississippi River, including that found in Kansas, Oklahoma, Texas and California, has usually a semi-asphaltic or asphaltic base, while pools of paraffine base crude are found in every petroleum bearing State and even in Mexico.

Cold test in some gas engine oils is a natural quality, while in others it has to be acquired by the removal of its content of paraffine wax. You have all, no doubt, noted that lard oil in cold weather congeals, some oils at a lower temperature than others. This condition is caused by the larger amount of stearic acid or stearine contained in the oil of the higher cold test. The more of this stearic acid removed, the lower will be the cold test, that is, the lower the temperature it will stand without congealing. In like manner petroleum oils distilled from semi-asphaltic or paraffine base crudes contain a certain amount of paraffine wax. The less the wax, of course the lower the cold test. This shows why asphaltic oils often possess a lower cold test than semi-asphaltic or paraffine base oils. Cold test lard oil is produced by chilling the oil and extracting the stearine by means of a filter press in a low temperature. In a similar manner paraffine base oils are treated to remove paraffine wax. As paraffine wax has absolutely no lubricating qualities, its removal should not injure any petroleum oil, although some oil dealers advertise that the wax has not been removed from their oils.

The viscosity may be a natural quality of the oil following its fractional distillation from the crude petroleum and subsequent refining and filtering, or it may be produced by compounded by a low-priced paraffine oil with cylinder stock, oleates, or stearates. All oils with naturally high viscosity are far superior to oils with what might be properly called artificial viscosity. It is not a hard matter to detect such oils, for they usually have a cloudy appearance, or on burning in an open vessel leave a residuum of unconsumed foreign matter.

In Europe and Great Britain much of the oil used for gas engines is from naphthene petroleum from the great Baku field. This oil is usually of a heavier body than asphaltic oils produced from American crude petroleum, although I have recently been shown some samples of American refined asphaltic oils that closely resemble Baku oils. As a result the trade abroad demands a heavy body oil, and I understand that gas engine oils exported for use abroad are usually thickened by the foreign distributors with cylinder stock in order to compete with more common thicker oils.

It has been reported that it is necessary to use sulphuric acid to separate the asphaltum for asphaltic oil distillates. This is as carefully denied, as it is claimed that the sulphuric acid treatment, such as some paraffine oils get, would ruin the asphaltum in asphaltic oils and that it, in itself, is too valuable to be thus wasted.

It is unfortunate for the user of gas engine oils that producers and dealers will indulge in acrimonious discussions as to the more valuable qualities of oils obtained from different crude petroleum.

I fully believe in honest competition. If I were to engage in the production and distribution of gas engine oils on my own account, I should establish a standard of excellence and distribute the oil under a registered trade-mark, in sealed packages only. I should not think of serving the owner of a high speed aeronautical gas engine with the same grade adaptable for best use with a heavy low speed stationary engine. If I were to receive complaints I should investigate the conditions, and if the fault was found to be in the selection of an im-

proper grade for best results, the substitution for another grade of either a thinner or thicker consistency would be a simple matter, providing my oils were properly selected and of uniform quality.

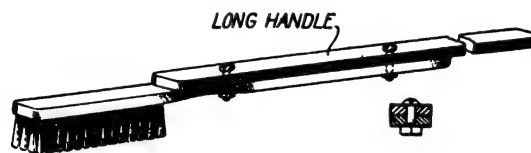
The United States Government purchases all lubricating oils on formula, cold test, gravity, viscosity, etc., with the exception of gas engine oils, and all requests for bids on these oils demand the trade name and grade of the goods offered.

Such a standard once adopted and established, unfair oil competition could not flourish, and the consumer would cease to be, as he now unquestionably is, the "goat."

In conclusion I have to say that I believe many of the puzzling gas engine lubricating problems could be solved and would stay solved, so far as they relate to the lubricant itself, were users of gas engine oils to demand established standard brands, and only accept them in sealed packages from reputable and responsible distributors.

A Cleaning Brush.

The illustration shows a little tool which comes in handy for cleaning dirt, carbon and copper dust from commutators and brush holders. It is made by fitting a good stiff toothbrush with a long handle, as shown in



Showing the Long Handle.

the sketch. When the bristles of the brush become worn, the brush may be taken off and the handle fitted with another. This brush is also handy for cleaning the parts of circuit-breakers and other switchboard appliances.

AUTOMOBILE PAINTING.

Materials, Utensils, Expert Information and Things the Car Owners Should Know.

BY M. C. HILLOCK.

The editorial allusion, in the June issue to the difficulty of furnishing reliable formulas for the manufacture of varnishes, lacquers, dressings, etc., is timely and to the point.

Very few car owners are in a position to work up a reliable lacquer, varnish, or dressing, from a batch of glibly stated formulas. All such formulas are of such a technical nature that to the average lay mind they present difficulties at the outset. Materials, utensils, and plenty of expert information are necessary to work up a mixture fit to apply to the automobile, and, in case of varnish, for example, even when properly made, months are required for it to reach a state fit for use. It is mere folly to suppose that any one, without expert skill and knowledge, and without proper appliances and equipment, can make a varnish anywhere near safe and decent to put on the car.

Valentine & Company, the internationally famous varnish making firm who monthly tell a graphic story of varnish in the advertising pages of *The Automobile Dealer and Repairer*, have spent many years and many fortunes in perfecting their goods. That the varnish they make is in a thousand ways superior to any home made concoction for all the requirements a first-class varnish is designed to meet, goes without saying. What

is true of varnish in this respect is true, wholly, or to a large extent, of most other materials necessary in shaping up the surface of the car for service.

As a rule, therefore, it is cheaper and about always safer, to go to the reliable manufacturer for the supplies used in painting and finishing the car.

The car owner and the car painter have a good deal of trouble sometimes in making the radiators look road worthy. They get splashed and besmeared, and in a short time, unless sharply looked after, they have a rusty and neglected appearance. A small vegetable brush, fairly stiff, will clean the radiators in good shape. An occasional coat of thin paint will keep the radiators looking well. Roughen the surface with No. ½ sand paper and then put the paint on thin. Buy the material of a reliable firm making a special radiator paint.

A thin coat of aluminum paint, made, if preferred, of powdered aluminum thinned with turpentine and given a binder of finishing varnish, using, say, one part varnish to 10 parts turpentine, gives excellent service. Not a few automobile painters use very thin coats of asphaltum paint for radiators. Thin coats of metallic paint also furnish good service.

Owners of cars with metal bodies, especially of sheet steel bodies, should keep their cars under constant inspection. Wherever, a blow or dent lands on the surface, clipping off the finish to the metal, such exposed part or parts should be sandpapered out clean and given a good coat of lead, earth or metallic paint. Keep the rust out if possible. Rust is the arch enemy of all metal surfaces. If rust is found to have developed upon the metal it should be ground off with emery paper, or rubbed with a coarse block of artificial rubbing stone dipped in raw linseed oil. Then coat immediately as above advised. Brass parts of the car, while not so popular as in former years, are still largely in evidence. Such parts, even under coats of lacquer appear to tarnish, and when not coated with lacquer actually do tarnish, under certain conditions of the atmosphere. When found in this condition with a good metal polish proceed to fetch the sharp, full lustre of the brass out under the erosive medium. Then, with some reliable lacquer, or with elastic finishing varnish let down thin with turpentine, coat the parts over solidly.

Lamps and many brass parts on the 1912 cars are now shown in the darker japan baked colors. These parts should get, and usually do get, a priming coat, one color coat, and a finishing coat, these coats being each baked in an oven from two to four hours. Black, and approximately black colors, are baked at 350 degrees. Obviously, metal surfaces with soldered parts or joints should not be baked in a temperature higher than what would cause the solder to melt. Japanning is almost, if not quite, a fine art. Heat in the oven should, essentially, be uniform. A variation of from 10 to 15 degrees of heat will generally cause a noticeable difference in the shade of the color. A temperature of from 100 to 150 degrees will suffice to bake blues and greens, while white and delicate yellows and creams, approximating white, should be baked at from 75 to 90 degrees. All colors may now be oven baked, and a wide latitude for selection is thus given the painter and car owner.

In looking after the upkeep of the car body the chassis, or running parts, should not be overlooked. These parts get a very bad sort of service and they merit careful attention. Give them frequent water baths, and, so far as possible keep the grease and oil wiped up. Use a mixture of turpentine and raw linseed oil, with, if necessary, a bit of pumice stone flour, to slick off the flakes of grease and road dust.

Then when the varnish becomes somewhat worn, with

its lustre beaten off, apply a good renovator and polish lightly with a soft woollen cloth.

The \$5,000 Lozier.

Color—Optional.

Seating Capacity—Five persons.

Clutch—Multiple disc.

Wheel Base—131 inches.

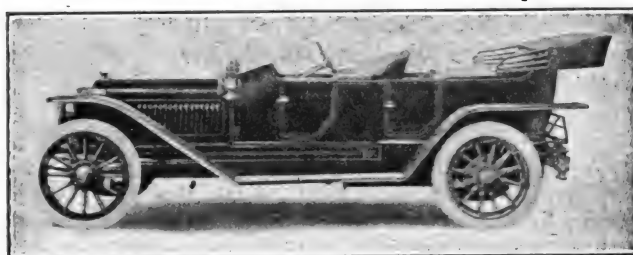
Gauge—56 inches.

Tire Dimensions—Front, 36x4½ inches; rear, 37x5 inches.

Brake Systems—Contracting and expanding on both rear wheels.

Horsepower—(A. L. A. M. rating) 51.6.

Cylinders—Six.



Lozier "Lakewood" Torpedo—Type 51.

Arranged—Vertically, under hood.

Cast—In pairs.

Bore—4⅝ inches.

Stroke—5½ inches.

Cooling—Water.

Radiator—Cellular.

Ignition—Jump spark.

Electric Source—High tension magneto and storage battery.

Drive—Shaft.

Transmission—Selective gear.

Gear Changes—Four forward, one reverse.

Sheet Metal for Limousine Back Panels.

The competition in prices in all kinds of body work has resulted in several changes in methods of production and in the materials used within the past few years. It is only a short time back that the prices paid were such that most any material could be used and the boss would come out right, but the steady grind has narrowed down the profits and today it is necessary to study well the cost of every piece of stock used, and especially is this so in regard to the metal that is used for the panels. Many different forms of steel have been used as a substitute for aluminum, and wherever it is possible to use steel, and the excess in the cost of working steel does not equal or exceed the difference of the first cost; between the two it is the general custom to use the cheaper priced metal.

One of the methods used to make a one piece back panel is illustrated by Figs. 1, 2 and 3, and it is the reproduction just as the writer saw it in the shop. Later in this article the writer will criticize the one thing wrong about the job.

Looking at Fig. 1 which is the section of a limousine, showing the three-quarter view of the rear side, and part of the rear of the body; the lower back panel must from its shape be made from aluminum, but the upper panel as indicated is made from three separate pieces of metal, in this case galvanized iron, of 20 gauge thickness. Fig. 1 shows the pieces assembled on the body and Figs. 2 and 3 show two of the pieces ready to be

put in place and fastened. There are two pieces like Fig. 2 and these make the complement of three pieces, necessary to complete the whole.

Fig. 3 is the back panel formed of one piece of galvanized iron and extending from the dotted line a, on Fig. 1, to the same position on the opposite side. This panel is first fastened in place with nails to the framing; then the piece, Fig. 2, is put in place and nailed and at the junction of the panels a, Fig. 1, each piece is filed

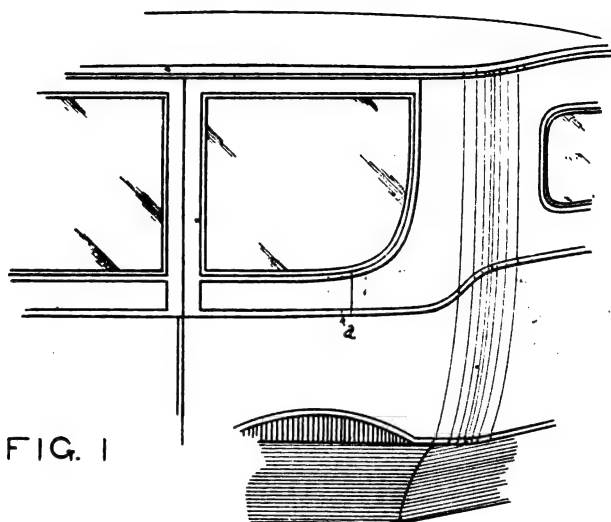


FIG. 1

tapering and then a flat piece of the same metal is put at the back of this lap, and the whole is wiped with acid and sweated together.

A good screw is put in at the top and the bottom of the joint, and so placed that it will later be covered with the moulding. The panel is then filed well so as to rake off all the loose flakes and the surface is left rough to form a grip for the paint. The mouldings are put on in the regular way and we have a one piece back panel that will defy the closest inspection. In forming the corners of the panel, Fig. 3, it will be necessary to beat

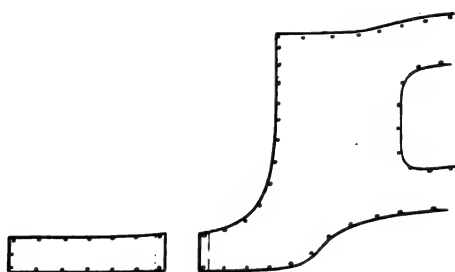


FIG. 2

FIG. 3

them a little as well as roll, in order to get a little swell up and down of the panel to make the paint surface look well. The reason for making this panel in separate pieces and joining them together on the body is that sheets of this metal cannot be purchased long enough to make the panel entire, therefore the necessity of splicing together.

In making a criticism of this panel method the writer would suggest that the splicing be done in the center of the back. The amount of labor making the splice would be the same, but the work of forming the back panel corners would be easier on account of it only being necessary to handle the one corner at a time, and there would be less weight of metal hanging and to be handled while the job was being done.

Nevertheless, this is a method of forming a long

panel from sheet metal that can always be had of any jobber in this line of material. And without regard to the size of the sheet purchased, the pieces can, as in the illustrations, be made to do service in lengthening out.

While it is possible that the labor in making two splices would equal the difference in cost of aluminum and galvanized iron, one must take into consideration that aluminum sufficiently long for the purpose illustrated, is often hard to get in the time required to do the job. The subject is well worth a trial by any one requiring quick results from the limited materials that may be at hand.

Noise in Motor Cars.

A touring car has not only to be adapted to give speed but also comfort, and there is perhaps nothing more distracting and annoying when on a journey than to find that some part of the car is noisy giving rise to a series of sounds which very considerably detract from the pleasure of the journey. One of the parts which is likely to give a good deal of trouble in this direction unless care is taken to prevent it is the bonnet of the engine and it may therefore be not without interest to mention a simple and speedy repair for trouble of this nature, which was discovered by the driver of a car which when driving fast rattled noisily. In searching around for a way to quiet the bonnet the driver hit upon the idea of getting two strips of rubber matting such as is used for mats on motor cars and he cut each strip about 2 inches wide. These strips were then tacked on to the bonnet boards and the bonnet was then shut down. On trying the arrangement even with the car running at full speed over hilly roads the rattle was found to have disappeared. Care should be taken, however, in adopting this method to see that the rubber from which the strips are cut is not too thick as otherwise it will be found that when they have been tacked on to the bonnet boards the bonnet will not shut down owing to the fact that the hole as cut in some bonnets will not free the radiator cap. With this provision however, it will be found that the method indicated above is very useful indeed.

Another instance of noise in a motor car which pointed to trouble which had to be cured may be given. In this case the car had been running for a considerable time, and was not therefore quite as new as when it was started. This car was being driven up hill and at a point in the road where the slope eased considerably the gear was changed on the car to get on to the top gear. When this was done, however, the driver immediately noticed a horrible noise as if something was very loose and he promptly stopped the car and made an inspection. When he had worked around a bit, he found that the universal joint which was a ball and socket joint had become very considerably worn and as the car was placed on a direct drive this joint rattled a tremendous amount. Under the circumstances the driver did the only thing which was possible without a complete refit and this was to change the ball over to the other part of the joint, but unfortunately in this case this did not cure the evil, although if the wear had been only moderately advanced it would probably have cured a very large proportion at any rate of the noise. In this case, however, it was necessary to take the car to the repair shop and have a new ball and socket fitted, and then the noise stopped, and the car ran as well as before.

These two instances are typical of the little difficulties which do so much to spoil the pleasure of a journey. There are other noises about a car which call for immediate attention owing to the fact that they act as danger signals when the engine or transmission gear is going

wrong owing to defects caused by, say, insufficient lubrication or other troubles. It would, however, be impossible to describe all these here, inasmuch as they would make this note of too great length. The above, however, may be taken as typical examples indicating the care which the driver must exercise to note sounds on his car, and to see whether they can by any means be stopped.

FOUR SPEEDS.

Not Only Far More Flexible Control but an Economy in Power.

From W. H. Cameron, Member Society of Automobile Engineers.—It may sound strange when I make the prediction that the next radical change in automobile engineering will be the general adoption of the four forward speed transmission. By that I mean that in my opinion the four-speed transmission is bound to become generally used in all good American cars. Today it is found in this country only in the highest priced cars. You can count on the fingers of one hand the cars selling under \$3,000 that now have four speeds forward. Abroad, where special reasons have forced the use of the four-speed transmission in the large majority of cars, its advantages are better understood.

One reason for its use on foreign cars is the extremely small bore of cylinders, due to the fact that the tax is graded by the size of the bore. An American car of more than four-inch bore has little demand in England where a bore of three inches and a fraction is generally used with an extremely long stroke, to give the maximum horsepower. Under such conditions the four-speed transmission is positively essential, both to economize the power and to gain the required flexibility of control. Its use under these conditions, however, only serves to illustrate the actual money-saving in fuel and less strain upon the machine, as well the advantages in driving which will come with the widespread adoption of the four-speed gear-box in America. For the same engineering principles apply in our case as in theirs.

Before passing the point of economy, let me say I believe that the tendency in America will be decidedly to smaller bore. This is due to the fact that everybody knows gasoline is becoming scarcer, and is sure to mount in price. I think the small bore is coming, even with the effort to popularize the six-cylinder car. The popular six-cylinder car of the future will be one with about the same piston displacement as the standard fours of the present.

Question of Cost.

The four-speed gear-box has been confined to high-priced cars in America, primarily because of its prohibitive cost. Engineers, and I may say manufacturers, almost unanimously admit the great advantage of four speeds over three, but the cost question has caused the delay until the demand of car buyers has become imperative. It means a complete change of design—more gears—wider gear centers—a big expense for the improvement, when all are totaled.

But the advantages to be gained from it are certainly so manifest, so great, that it is a question of only months when it will be generally accepted. And with our roads, the four-speed transmission comes to general practice none too soon. Motorists generally realize now, that the life of a car depends upon its use and abuse. It does not take a car owner long to reason to the fact that making a car put forth every ounce of power on frequent grades is highly detrimental.

"Learn to control your car exclusively by the gas,

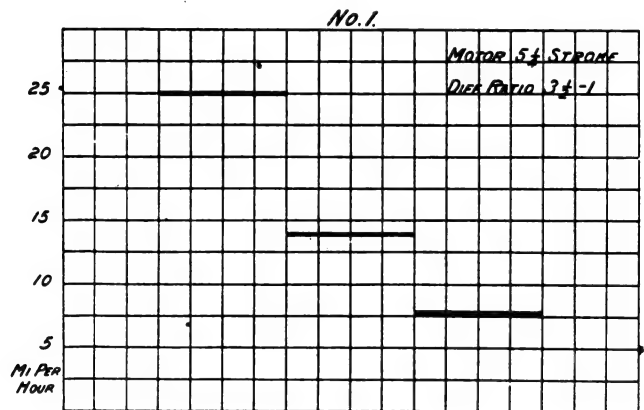
as far as possible," says the instructor in motoring, to the school. The salesman says the same thing to the beginner who has purchased his car, in ninety-nine cases out of a hundred. Everybody who gives advice on running a car says it, thereby admitting that something is wrong, or lacking in the transmission. Yet everybody realizes on a moment's reflection that the transmission is the logical first means for the control of the speed.

Now it takes long experience and special aptness—I may say genius—for driving to know just how far to throttle in regulating a car by gas. Few ever learn it perfectly. The driver who does it with any degree of skill, knows his car like a human friend and brother, and is also guided by some sixth sense of intuition.

Economy in Four-Speed Operation.

With the big majority this dependence almost entirely on the gas for regulating the car is a matter of guesswork. It is disastrous not only to the pocketbook but in not a few cases to human life.

It costs money to pull the engine speed down until the car almost quits on high, and then to race the engine to pick up on second, as is so commonly practiced. We



have grown used to the sight of the driver on high gear, killing his motor at street crossings, street car tracks and railroad tracks, by throttling down before he can get his clutch out. If instead he slips into third speed on a proper four-speed transmission, he has a gear ratio which is practically the same as a $4\frac{1}{2}$ to 1 rear axle—by having which, as any one knows, the car can easily be throttled down to two or three miles an hour, and still pick up quickly.

By this time it should not be necessary to explain that the basic purpose of four-speed transmission is not to satisfy a mania for more speed. This was a common error when the four-speed transmission was rare practice.

Four-speed transmission provides an efficient, feasible and logical control of the car—a control not based on guesswork, but upon an accurate, proved and dependable gear-box, built in accordance with universally acknowledged mechanical principles, and in accordance with the best engineering practice the world over.

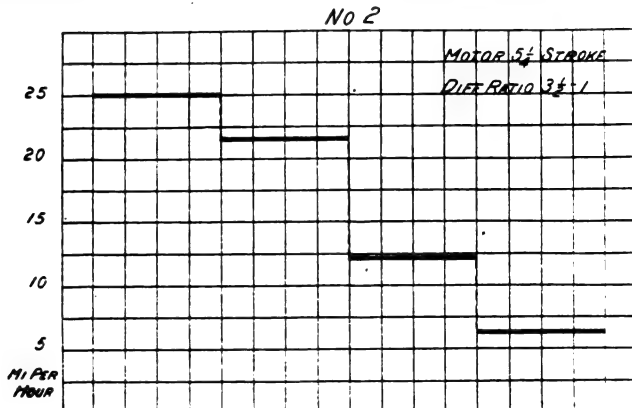
It provides this control without wasting the fuel—without racing the motor, and consequently with far less vibration. It relieves the motor of undue strain, especially in taking heavy grades. With four speeds (the direct drive being on the fourth) the long sand stretches—the heavy mud roads—the miles of axle-deep slush—the hills and mountains may be negotiated without fear of punishing the motor, in the way that now works havoc, and shortens by years the life of the best car built.

Unless one has actually driven with a four-speed transmission, he does not know the satisfaction and pleasure

that it adds to driving. To those who have not tried it I would say: Make a test of two cars, one with a proper four-speed gear-box, and the other with three speeds, both having the same top-gear ratio, and thus having the same speed possibilities. You will be amazed at the difference in efficiency of control—the certainty of having just the speed you want when you want it—the reduction of the work of driving. You will never want to go back to a three-speed transmission.

Just Too Much Pull.

Grade climbing is one of the problems most satisfactorily solved by the four-speed gear-box. Every motorist knows that unless he has an engine on which he can depend for a practically unlimited pull, he will find the inclination of many grades just a trifle too much for his



top-speed. On such a grade with a four-speed gear-box he can drop to third speed and it takes his car up like a bird.

With a three-speed car, he has to drop from top speed to second—and he makes an awful drop—in fact, almost 50 per cent. lower than high. If you have had this experience, you know that resigned expression with which everybody settles back in the car, to make the best of it until the car can be thrown into high gear. The same condition is encountered in many roads which are just a little too heavy for top speed. The funeral pace then has to be taken on second speed, although the car is actually capable of much better speed on these roads.

We shall understand the necessity of the four-speed transmission more perfectly, if we say that while the speed ratios of a proper four-speed car are 1, 2, 3, 4 (the fourth being the top speed) the speed ratios of a three-speed car are really 1, 2, 4—the gap between second and high being so great that there is really no third speed. So when we put in a four-speed gear-box we are actually adding a third speed to the car.

I have talked to many veteran motorists, and they agree with me that the four-speed gear-box is needed everywhere, everyday, not only to climb grades, and not only to do away with unnecessary engine racing, but to provide a really essential speed, between second and high where the gap now exists.

Direct Drive on Fourth.

The greatest question in four-speed transmission is the ratios of the gearing, or the number of times the motor must turn over to the number of revolutions of the rear wheels. The subject has engaged the attention of the leading engineers in Europe and America for several years; but it is only lately that they have practically agreed as to the direct drive.

There are two types of four-speed transmissions:

One direct on third speed, the other direct on fourth. The latter is generally conceded to be greatly in advance of the former. This is overwhelmingly proved by the practice on the great majority of cars now using the four-speed gear-box. Of 157 four-speed foreign cars, 132 have the direct drive on fourth. Of the American cars now using four-speeds, 75 per cent. have the direct drive on the fourth. In fact, as the four-speed gear-box gains in favor the indirect fourth will drop out overnight.

A study of the tables and diagrams shown herewith will enable you to see the difference at a glance. Table 1 shows a common three-speed transmission which is about what is fitted to 85 per cent. of the three-speed cars. You will note that three and one-half rear axle gear ratio is used in all three tables. If the driver rushes his car at a hill on the high gear and has to change down he goes to second, which is almost 50 per cent. lower than high.

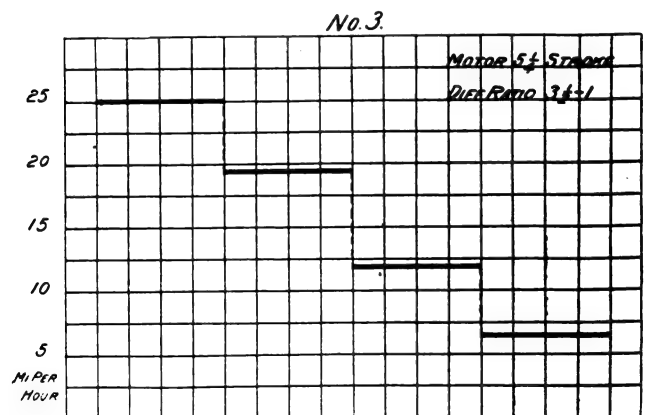
You will also note that in this transmission the first or low speed is only 11.20 to one. This is the reason that so many cars are forced to back over the stiffer grades if there is no other way round. The reverse of course is lower. This is the result of transmission design.

Take the next table now, which is No. 2. It shows a transmission of a well-known and popular car. This is for the motorist who thinks he wants to burn up the roads, and who buys a car with an indirect fourth.

He overlooks the fact that he loses almost all that he thinks he gains, through the inefficiency of the gears, and has two speeds which are almost alike. You will also note that he has not much better second and low than his friend with the three-speed.

The Ideal Transmission.

Now, the ideal transmission, in my opinion, is shown in table No. 3. It will be seen that, when it is necessary to change from fourth to third, a speed is obtained which enables the car to go over the hill at a fairly good rate. Also note that the second in this is almost between the



first and second of the others, consequently if the car is fitted with a good clutch, the operation for all ordinary driving resolves itself down to a three-speed job (as the second can be used for starting on the level) leaving the extremely low first and reverse for emergency.

In the above, I have but briefly outlined facts on which the judgment of the best engineers at home and abroad is based, in favor of four-speed transmission. Taking all these facts (and the showing of the tables and diagrams herewith) into intelligent consideration, everyone

must realize that four speeds, with the direct drive on the fourth, is the immediate step in the evolution of the leading cars.

TABLE NO. 1.

Speed	Trans. Ratios	Ratios— Engine to Wheels
3	1 -1	3.5
2	1.8 -1	6.30
1	3.2 -1	11.20
R	3.88-1	13.58

TABLE NO. 2.

Speed	Trans. Ratios	Ratios— Engine to Wheels
4	.86-1	3.01
3	1 -1	3.5
2	1.76-1	6.16
1	3.4 -1	11.90
R	4.6 -1	16.10

TABLE NO. 3.

Speed	Trans. Ratios	Ratios— Engine to Wheels
4	1 -1	3.5
3	1.29-1	4.51
2	2.1 -1	7.35
1	3.76-1	13.16
R	4.57-1	15.99

STEAM CAR DEPARTMENT

This department is intended for owners, users and others interested in the steam car.

Those who have trouble with their steam cars are asked to give clear and full particulars, and their queries will be answered as correctly as possible by an expert. It will be considered a favor if our readers will contribute to this department, giving such information as may be useful to others using the steam car.

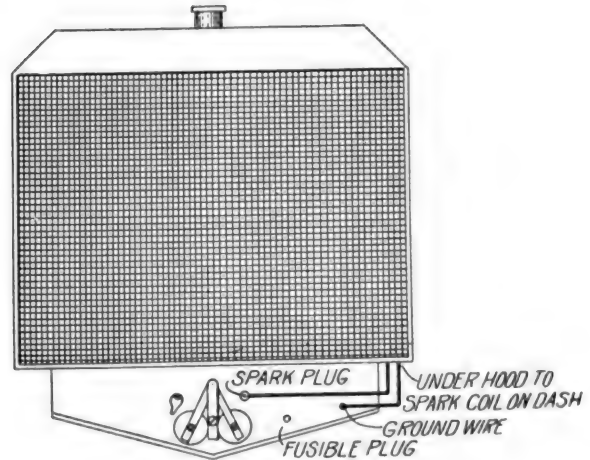
White Steamer Information.

From Dr. B. S. Hall, Connecticut.—I had an old 1904 White steamer that went through everything possible for an automobile, and will still go twenty-five miles an hour and carry a big load. I am now driving a 1907 White steamer, and would like to ask some questions. I have hard work to keep my packings tight; in fact, I cannot do it. Both valves and pistons are loose. This consumption of water is really my only great trouble. How many miles should that car make on a tank of water? What is the best packing to use? I have the flow motor fire shut off at 550 pounds, but the steam is not up to 390 degrees hardly any of the time. The fire register is about 30 degrees on the gauge. I think it should be over 40 with 50 pounds air pressure. Am I right? Can anyone tell me how to set the valves and pistons? The oil for the engine is fed twice as fast as the cylinders. They look like the same sized pumps, and it seems to me that they should pump the same amount. As there is no place near me where I can get a steam car fixed I am my own repair man. Am going to take down my engine, as I have a pound and rather rough running while climbing a grade or first starting, and I want to get the right measurements for setting the valves and pistons.

(Note.—Some of our readers who are familiar with the White steamer may be able to answer our correspondent, and, if so, it will be a favor to him and to us.)

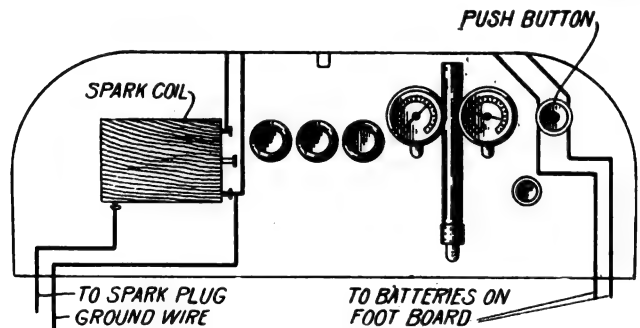
That Re-lighting Device.

From Edwin L. Ide, Michigan.—I have received so many letters of inquiry in regard to the device for re-lighting the pilot-burner on Stanley steam cars, described by me in The Automobile Dealer and Repairer, that I am enclosing herewith a sketch showing just how to wire it up. It does not require an expensive coil or spark plug to do this work, the XCEL Jump Spark Coil,



their quick action mica spark plug, stamped metal push button and four 2½x6 inch dry cells are what I use. I use No. 18 rubber-covered wire from batteries to coil and ground, and No. 14 wire from coil to spark plug. Will say that I have used this device all last season and thus far this season and would not be without it for ten times the cost of installation.

Any further information will be cheerfully furnished



in answer to inquiries through your valuable paper, thus giving all readers the benefit—which are my reasons for sending this sketch and explanation. The increased pleasure of Stanley owners using this device will amply repay me for the trouble.

Address Wanted.

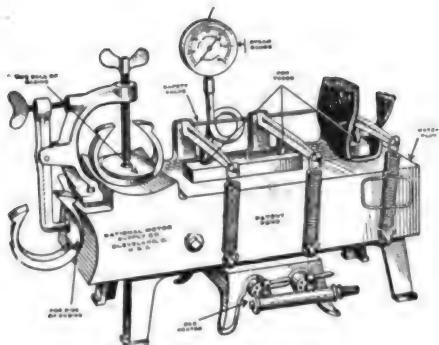
One of our readers would like to communicate with B. F. Martin of Indiana, who made some suggestions under the heading, "How to Protect Tires," some month ago. In some way his address has been lost or mislaid (if we ever had it) and if this reaches his eye it will be a favor if he will forward his full address to this office.

In replacing a rod end, particularly one of the yoke type, the driver should be careful to put the cotter pin at the bottom. If at the top, when it falls out, the pin will drop out also.

Several articles on the Steam Car are unavoidably left over for the August issue.

Vulcanizing Is Easy.

Most repair men realize the large profits in vulcanizing, but due to the complicated machines which have been on the market, many have felt they were unable to do this work. Another thing which has kept vulcanizing plants out of the average garage is the high cost of the machines. Realizing the need of a simple practicable vulcanizer for garages, at a small cost, The National Motor Supply Company, of Cleveland, O., manufacturers of tire re-



No. 1 National Garage Vulcanizer

pair outfits, have placed on the market what they call the "National" Garage Vulcanizer. This machine will repair three tubes and two casings at a time, and do the work right, as it was designed by a man long connected with one of the largest rubber factories in the world. The water is placed directly in the machine, and heated with either a gas or gasoline burner, which are furnished complete with the outfit. The vulcanizer can also be connected to a



Hand Vulcanizer on a Casing.

steam line, if one is available. Steam can be obtained in about 25 minutes, and the cost of fuel to keep it at the right temperature is about one-half cent per hour. It is, therefore, very economical. A high grade steam gauge and safety valve are used. The complete outfit only weighs seventy pounds, and is the most compact machine on the market, doing as much work as other vulcanizers weighing three times as much, and costing in proportion. The body is made of semi-steel, and all other parts of malleable iron. All vulcanizing surfaces are carefully machined,

and everything is put up in first-class shape throughout. The manufacturers state that about \$120 worth of work can be turned out in 10 hours, if the machine is kept running full capacity. There is nothing about it to wear out or get out of order. This firm is making a special offer in selling at the present time, and any one interested should write direct to them, mentioning The Automobile Dealer and Repairer.

This machine is also made by the National Motor Supply Company, of Cleveland, and has been sold on trial for nearly four years. It consists of a hollow brass body partly filled with water. This water is formed into steam by means of a wood alcohol lamp, thus making it on the same principle as large steam vulcanizing plants. The steam feature eliminates the danger of burning the rubber, which often results from the use of dry heated vulcanizers unless carefully watched. Steam also gives the "life" and toughness to the patch to withstand the wear. The heat is controlled perfectly by the alcohol lamp with adjustable burner. The "National" will repair both tubes and casings of any size, the latter being vulcanized without removing from the rim. It is very simple to operate, and full instructions with a complete outfit of all supplies are packed in a neat wooden box with slide cover. It is very compact, and can easily be tucked away in the tool box, and repairs made along the roadside when desired. Its weight complete is only four pounds. Price with everything included, \$12.00. For free trial offer see front cover of this magazine.

Dixon's Automobile Lubricants.—Our readers who have never tried the lubricants manufactured by the Joseph Dixon Crucible Company, Jersey City, N. J., the basis of which is graphite, have something to learn. Almost everybody understands the lubricating qualities connected with graphite, but it has remained for the Joseph Dixon Crucible Company to bring these qualities to a very high degree of perfection in the lubricants which they manufacture. They want to send a sample to every reader of The Automobile Dealer and Repairer. All you have to do is cut out the advertisement and write to them to send you a sample of 184-G.

"Michigan" Motor Cars.—Michigan Buggy Company, makers of Michigan Motor Cars, of Kalamazoo, Mich., is coming to the front rapidly. It recently secured the services of W. H. Cameron, for many years the chief engineer of the Willys-Overland Company, who will be the head of the Michigan engineering staff. Now we learn that George H. Daugherty, formerly connected with Lord & Thomas, and previous to that with the Long-Critchfield Corporation, has become advertising manager. This move on the part of the Michigan Buggy Company insures an intelligent advertising campaign and a proper selection of mediums.

Michener's Gasoline Saver and Primer.—In this issue will be found the new announcement of E. S. Michener, 800 Washington street, New Castle, Pa., illustrating and briefly describing his gasoline saver and primer. He claims that it will positively save 25 per cent. of the gasoline you now use, and if it will do this, there is not an automobile owner in this country who will not be glad to know about it. See testimonials

in the advertisement and write for further particulars. Dealers everywhere sell this or ought to, but if your dealer does not have it, write direct to the manufacturers as above.

To Save Money.—The Buckeye Sales Company, 1123 Guest street, Cincinnati, Ohio, has an announcement in this issue of its Auto Steam Vulcanizer for casings and inner tubes, by the use of which the company says not only money can be saved but tires can be saved. It says there is nothing intricate or delicate about their machine. Consult the advertisement for further particulars, and mention The Automobile Dealer and Repairer.

The Rhineland Machine Works Company, Ball Bearings, 140 West 42d street, New York City, have opened an office and store at 1254 Michigan avenue, Chicago, Ill., in which they will carry a stock of Rhineland and R. B. F. Ball Bearings for the garage and supply trade in the Chicago territory. Mr. D. D. Davis will be in charge of this office.

The Gwynn-Bacon Automatic Steam Vulcanizer.—On another page will be found an announcement of the Gwynn-Bacon Vulcanizer Company, 1456 Goodfellow avenue, St. Louis, Mo. This company manufactures the Gwynn-Bacon Automatic Steam Vulcanizer which is absolutely guaranteed not to burn a tube or require watching. A written guarantee is given with each vulcanizer that it will not cause trouble for one year. It is made in three sizes for the private owner, for the small garage and for the garage doing a large business in tube repairing. Write for catalogue and terms with copy of guarantee and ask your dealer to write to the above company also, mentioning The Automobile Dealer and Repairer.

A New Motor Starter.—This is a pneumatic device for starting gasoline engines and is particularly adapted to automobiles using gasoline motors. The action of the Starter is identical with that of hand cranking; it starts the motor turning before any explosions take place in the cylinders of the engine. It can be easily attached to any make of car, and will start the motor—not a part of the time, but every time, the makers say, and it never fails. It will start the motor, furnish air for the tires, and can be utilized as a brake for the car. Address all communications to The Standard Starter Company, Franklin, Pa., and mention this magazine.

New Anti-Rattling Spring Ball Socket.—If you are an owner of a Model T Ford car and your front axle radius rod rattles, write at once to the Atlantic Machine Company, 963 Atlantic avenue, Brooklyn, N. Y., for circular which will give you full particulars as to their method of curing this trouble.

Auto Wheels Rebuilt.—Meeker Manufacturing Company, of Dayton, Ohio, make a specialty of rebuilding automobile wheels. They make all types of auto rims and tires. Write to them for particulars and prices.

Send for free sample of The Automobile Dealer and Repairer.

MOTOR VEHICLE PUBLISHING CO.,
71-73 Murray St., New York.

TIRES FACTORY to CONSUMER

Cut Middlemen's Profit

TO AUTOMOBILE OWNERS A SPECIAL PROPOSITION

Tire expense is the car owner's heaviest burden.
We show you how to **SAVE MONEY.**

Automobile owners would not find it to their advantage to establish a plant for the manufacture of tires for their own use. Through a plan herewith, however, a few can become part owners of a going tire concern, doing a successful, profitable, growing business in manufacturing **FRONTIER TIRES.**

We will sell five hundred shares preferred, seven per cent. cumulative stock of this company to Automobilists, not more than one share, par value \$100.00, to an owner, giving with each share a certificate entitling the shareholder to preferred list prices, averaging about twenty-five per cent. less than consumer's list on all tires, casings and tubes for his or her personal use, while a stockholder of record.

FRONTIER prices are now twenty to thirty-five per cent. under those of the so-called guaranteed tire. The additional shareholder's discount for Frontier casings and tubes will average a saving of \$100.00 per car, based upon the use of six casings per annum, or equal to one hundred per cent dividends a year per car, in addition to the seven per cent. preferred dividends. As a stockholder, you will declare yourself a dividend automatically on every purchase made.

We invite most rigid investigation.

If interested, sign coupon and send in for full particulars.

Let us serve you direct on

FRONTIER TIRES

No better Shoes made at any price.

NOTE THE PRICES. 

SIZE	CASINGS	TUBES	SIZE	CASINGS	TUBES
28 x 3	\$10.65	\$2.90	31 x 4	\$24.00	\$5.40
30 x 3	11.40	3.15	32 x 4	25.75	5.50
32 x 3	12.00	3.35	33 x 4	26.75	5.75
29 x 3 1/2	15.75	4.15	34 x 4	28.00	5.90
30 x 3 1/2	16.75	4.25	35 x 4	29.00	6.00
31 x 3 1/2	17.50	4.35	36 x 4	30.00	6.20
32 x 3	18.00	4.45	34 x 4 1/2	34.00	7.30
34 x 3	19.55	4.75	35 x 4 1/2	35.25	7.45
30 x 4	23.50	5.25	36 x 4 1/2	36.50	7.65



TRADE MARK

Our Officers

ORSEN E. YEAGER, President
President Buffalo Chamber of Commerce.
President Victor Motor Truck Co.
Director Union Stock Yards Bank.
Wholesale Lumber Merchant.

FRANK V. E. BARDOL, 1st Vice-President
Buffalo Dredging Co.
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A. R. ROBERTSON,
Assistant Treasurer and Secretary
JOHN N. GARDNER, General Manager

CHARLES F. BENZING, Director
Treasurer Buffalo Bank Note Co.
These are leading Buffalo business men.

Frontier Tire & Rubber Co.

General Offices and Salesrooms

1054 Main Street

BUFFALO - - NEW YORK

Coupon

Without any obligation, expense or risk on my part, please send full particulars of your stock proposition to me.

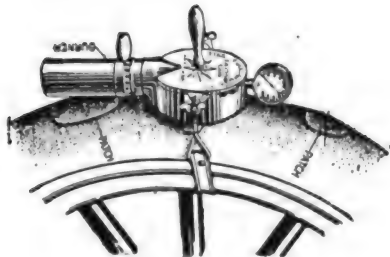
Name

Full Address.....

Please mention the Automobile Dealer and Repairer when writing to advertisers.

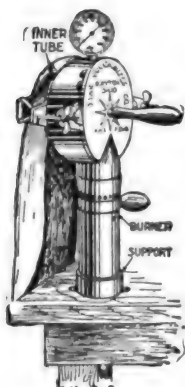
The Star Vulcanizer.

This vulcanizer, as illustrated herewith, is highly recommended, although the complete outfit will be sent to any car owner for only \$6.00, cash with order. The casing can be vulcanized



In Use on a Casing.

right on the wheel as shown in one of the cuts, while the vulcanizer can also be used effectively on inner tubes, as shown in the other illustration. Interested readers should send their orders



In Use on an Inner Tube.

or write for full particulars to The Star Vulcanizer Company, 276 North High street, Columbus, O., and mention this magazine. Correspondence is invited from dealers and car owners.

Red Cross Insignias for Doctors.—

The variety of Red Cross insignias used by doctors upon their automobiles are about as numerous as inartistic. This emblem upon your car gives you the right of way and this means much sometimes. Then again, a red cross is a protection against over-zealous officers, whose knowledge of speed is most frequently questioned. There are all kinds of emblems for doctor's cars, but the one made by the Hickok Manufacturing Company, 44 St. Paul street, Rochester, N. Y., is artistic and attractive. It is a bit of beautifully enameled work with the owner's monogram in polished brass. It is dignified and refined. It specializes your car and is inexpensive.

The Hickok Manufacturing Company are also makers of the famous Hickok radiator monograms. Write them at once for further information.

Stolen Autos.—Every little while somebody who leaves an automobile standing on the streets loses it because it is not locked. The Blackburn Specialty Company, 1124 Prospect avenue, S. E., Cleveland, Ohio, makes an automobile lock switch, which will prevent cars from being stolen and cost is comparatively trifling. Write at once, giving name of car, year and ignition.

Air Compressors.—Fairbanks, Morse & Co., 900 So. Wabash avenue, Chicago,

Ill., have an announcement in this issue of their air compressors for garage use. They say these compressors are well built and durable. The reputation of this company for turning out well-built machines is wide spread. Write for catalogue No. SA-1419, which will give you full particulars.

Rub-On Varnish Co. Specialties.—

Special attention of our readers is called to the new advertisement in this issue from the Rub-On Varnish Co. of Buffalo, N. Y. This company manufactures valuable specialties for the renewal of automobile tops, cushions, hoods, fenders, etc. Rub-On Auto Top Lining Dye will dye any spotted or faded old top lining perfectly black at one application with a sponge, without removing the top. Rub-R-Tite Auto Top Waterproof Gum will surface mohair cravenette, pantasote or rubber tops with a durable surface elastic as leather and exactly similar in appearance. Col-R-Ol Leather Dye renews the upholstery by penetrating and dyeing the leather, to stay as long as there is leather to hold it, giving it the same color and finish that the tanner used, or it will dye the leather to match new painting. It comes in five colors, black, green, maroon, red and tan. Rub-On Varnish is a varnish made by a new process. It can be put on smoothly with a cloth or brush. With this varnish you can renew faded hoods and fenders in half an hour, without any objectionable stickiness. This varnish may be applied by a novice with complete success. Each can of the above goods is sold under an absolute guarantee that they must give satisfaction or money refunded. Write for full information and free samples of work to the Rub-On Varnish Co., Elm street, Buffalo, N. Y., and mention this magazine.

Special Offer to Car Owners.—A novel offer is made to car owners in a new full-page advertisement, which appears in this issue. The Frontier Tire & Rubber Co., operating a large plant for the manufacture of tires at Buffalo, N. Y. They are offering a limited issue of preferred stock, a seven per cent. accumulative security. Each share will be sold at par value \$100, and in addition to the seven per cent interest the car owner who purchases a share will be entitled to a sufficient discount on tire purchases to amount to a saving of \$100 in one year, on the basis of average tire consumption, the idea being to eliminate the jobbers' and dealers' profit. As to the financial standing of the Frontier Tire & Rubber Co. it is said to be backed by leading capitalists of Buffalo, and the most rigid investigation is invited. Fill out the coupon attached to the advertisement and send it in for complete information. If not interested in the stock proposition you may still be interested in Frontier Tires, which are of highest quality and fully guaranteed yet much lower in price than some other makes. In writing address Frontier Tire & Rubber Co., 1054 Main street, Buffalo, N. Y., and mention this magazine.

Liberty Rubber Company, of Orange, N. J., manufacturers of MEN-DO for repairing tires and tubes, are erecting a new factory to be devoted exclusively to the manufacture of their specialties. The officers of this company are Harold T. Ray, president and general manager, and Charles A. Whelan, secretary and treasurer. Mr. Whelan is president of the United Cigar Stores Company. The

new factory when complete will be able to turn out one million outfits per year besides large quantities of all the other specialties of the company manufactures.

Perfection Quick Detachable

mover.—The Perfection Manufacturing Company of New Martinsville, have an announcement in this issue illustrating and briefly describing the Perfection Quick Detachable rim mover, which they say will remove most stubborn rims with such ease that any man, woman or child can operate it. It consists of a point of a recess between two flanges and one downward motion of rim releases the rim is released. Those who had trouble in this direction in the past should consult this advertisement either order one direct or through a dealer, or send to the company as a further particulars. This device seems to be a device which has long been needed.

Barrett Automobile Jacks.—

We understand that The Duff Manufacturing Company, of Pittsburgh, Pa., exclusive manufacturers of the Barrett automobile jacks have purchased five acres of ground on the line of the Pennsylvania and B. & O. railroad, and will start once the erection of a new factory which it is said will be the largest in the world devoted exclusively to the manufacture of jacks. This company only makes a line of automobile jacks but jacks for all sorts of purposes. They make a Barrett jack of just right size and capacity for any type of size of American or foreign motor or truck. Write for descriptive circular giving full particulars, and mention Automobile Dealer and Repairer.

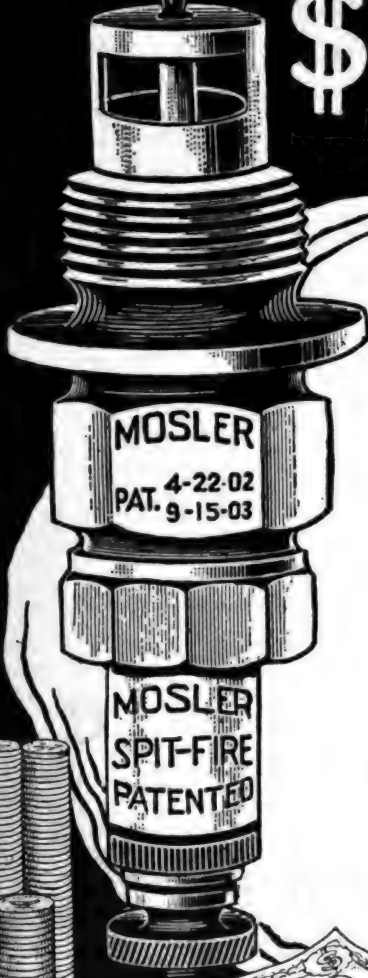
Johnston's "Krakno."—Not a few of our readers will be interested in an announcement in this issue of the R. Johnston Paint Company of Cincinnati, Ohio, briefly describing a preparation manufactured by this company called "Krakno." Three or four coats of this preparation it is said gives a perfect surface and basis for the finishing coats, doing away entirely with filler or rough-stuff. It is guaranteed not to crack or craze. With the use of "Krakno" there is no more necessity for burning off old paint on repair work. It is in use in the largest automobile and carriage factories in the country. If any of our readers desire to see testimonials in favor of "Krakno," write to the manufacturers above and they will be promptly sent. This preparation is for sale or ought to be by dealers everywhere, but will be sent by the manufacturers to those of our readers whose dealers do not keep it.

Superior Drop-Forgings.—J. H. Williams & Co., 17 Richards street, Brooklyn, N. Y., have a full-page announcement in this issue directing attention to their superior drop-forgings which a great many of our readers will be interested in. They have recently brought out an interesting edition of their catalogue and want to send a copy to any reader interested.

The Sturdy Manufacturing Company, of Chicago, Ill., manufacturers of the Sturdy Spark Plug have granted the Cedar Rapids Sales Company of Cedar Rapids, Iowa, the exclusive sales right of the Sturdy Plugs in the State of Iowa, who have opened an office at Avenue "A" and 4th street of that city.

Mosler Spit Fire Plugs

PUT MONEY IN YOUR POCKET



MANUFACTURERS

Greater Satisfaction from your cars

DEALERS

More Sales — More Profits

USERS

Least Trouble — Least Expense

Spit Fire

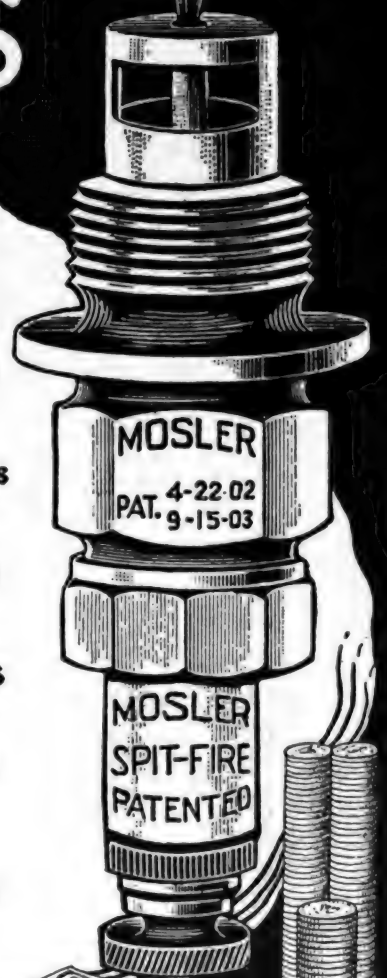
Platinum-Pointed Plugs
Outlast All Others

Made to fit any engine—any thread

WORK EQUALLY WELL
ON BATTERY OR MAGNETO

Insist on the Special Octagonal Brass Cap
marked Mosler, N. Y.

BEWARE OF IMITATIONS



A. R. MOSLER & CO.,
P. O. BOX "M"
MT. VERNON, N. Y.

A Guaranteed Radiator.

About the only way to insure absolute satisfaction in a radiator, is to see it is either guaranteed or is made by a reliable manufacturer. The Eureka Diamond Honeycomb Radiator has both of these securities. Moreover, it



The Eureka Radiator.

is all radiating surface, having no fins, and thus it really radiates to perfection. It is very strong and handsome, built in any size, is guaranteed and the guarantee means just what it states. Address the Eureka Auto Parts Manufacturing Company, 3000 Olive street, St. Louis, Mo.

A Garage Necessity.

We are showing herewith a new portable unit which The Gardner Governor Company, Station R, Quincy, Ill., have recently put on the market. This complete electrical pumping unit satisfactorily meets the demands of the garage owner, being a tire pumping outfit that can be rolled right next to the car. This is quite a convenience when an automobile is on the street and the tires are to be inflated in a hurry. The air tank will carry enough pressure to properly inflate four tires so that the customer may have his tires inflated and disposed of in a hurry without operating the motor of the unit.

This outfit consists of the Gardner Air-Cooled Compressor connected by gear and rawhide pinion to an electric motor, one air tank, 10 feet of air hose, 20 feet of lampcord with socket, all

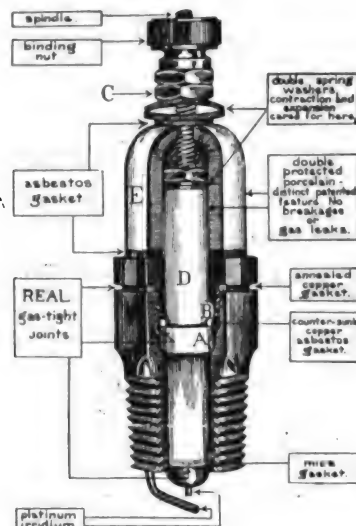


A Tire Pumping Outfit.

mounted on a four wheel, easy running, light weight truck. A gauge for the tank and also a tire pressure gauge are furnished. This tire pressure gauge shows the exact pressure of the air in the tires and is one of the special features of the equipment. A reliable safety valve is also furnished with the air receiver. A complete catalog showing the different combinations of garage pumps has recently been issued by the above company, who no doubt will be perfectly willing to send it to any of our readers who are interested.

A New and Novel Spark Plug.

A two piece or two unit Spark Plug called the Sturdy, manufactured by the Sturdy Manufacturing Company of Chicago, has been attracting considerable attention on account of the fact that the plug is very accessible for cleaning. The porcelain is suspended against the bushing instead of being clamped in place, and for this reason it is claimed that the Sturdy will resist the severest heat and vibration. The peculiar construction is illustrated in the Sturdy porcelain, as the center electrode is loosely fitted in the porcelain and has a flattened end which is drawn tight against the porcelain by a nut on the opposite end, placed over two spring washers. However, two mica gaskets are inserted between the flattened portion of the electrode and the porcelain, making a perfect seat. These plugs are put up in outfits for the four- and six-



STURDY SPARK PLUG
(crossed view)

cylinder cars, and an extra or emergency plug is furnished in a leather carrying case, to be used in event a plug is returned for replacement, as the Sturdy Plugs are covered by their unique unconditional insurance policy. For full information and prices, address the Sturdy Manufacturing Company, 2637 Michigan avenue, Chicago.

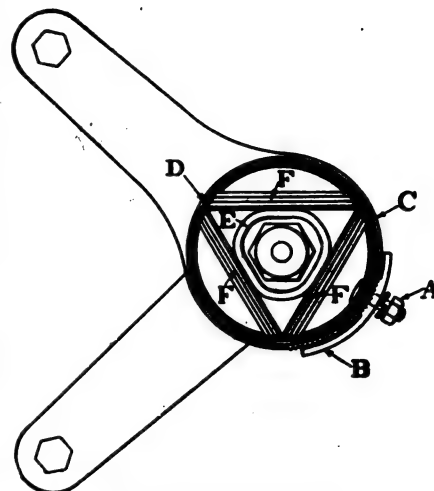
Improved Adjustment.

The Connecticut Shock Absorber Company of Meriden, Conn., have added an improved adjustment to their shock absorbers which greatly simplifies the method of attaching. After the absorbers are installed on the car, they actually adjust themselves. This adjustment is then made permanent by locking one nut. The adjustment is a very simple operation and is secured as follows:

Loosen the adjustment nut (A), load the car with one more than the full complement of passengers for which it is designed, then tighten the nut, and adjustment is properly made. Loosening the adjustment nut (A) disengages the milled segment (B) which fits into the teeth on the outside of the case (C) and allows the removable ring (D) to be moved in any position desired. The position of the cam (E) and springs (F) is governed by the motion of this ring so that the neutral position of the cam can be permanently locked wherever necessary in order to give the maximum efficiency of the absorber. It will be

noticed that the adjustment nut and segment lock the internal parts to the casing, the action of the cam on the springs being carried according to the location of the cam in respect to the springs, greater or less tension being obtained by changing the location of the cam in relation to the weight carried and the flexibility of the car springs.

Ten prominent manufacturers have

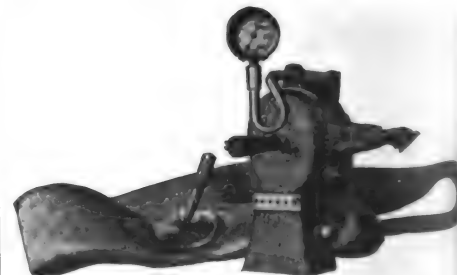


Connecticut Shock Absorber.

already adopted Connecticut shock absorbers, although they have been on the market only a little over a year. The absorber is entirely original in its design—it is not built on the friction principle—therefore the manufacturer claims it will require little or no attention, after once installed on the car. Large shipments of this material have been made to Lange & Co., Turin, Italy, makers of the famous Fiat car.

The Auto Steam Vulcanizer.

This is a perfected portable vulcanizer. It is really a miniature tubular brass boiler partly filled with water heated by denatured or wood alcohol. It is operated by an easily adjustable burner, which controls the steam at the exact temperature for vulcanizing rubber. It works on the same principle as large steam vulcanizers, used in tire factories. The steam heat does not fluctuate but maintains a steady even temperature, perfectly distributed over the



Vulcanizing an Inner Tube.

face of the whole vulcanizing plate. There is no danger of burning the rubber. The device is absolutely safe. The tiny boilers used are of best metal and tested as high as 500 pounds pressure, though only 50 or 60 pounds is used for vulcanizing. The cut shows this vulcanizer in use repairing an inner tube. It can, of course, be used just as effectively on a casing. Write for full particulars to The Buckeye Sales Company, 1123 Guest street, Cincinnati, Ohio, and mention this magazine.

A Plain Talk on Carbon Deposit.

There are three mistaken ideas on carbon deposit.

(1) Light colored oil is commonly supposed to leave the least carbon deposit. (2) Heavy-bodied oils are often avoided through fear of excessive carbon deposit. (3) Claims that some lubricating oils are "non-carbon" are often accepted as sound.

Our experience has clearly shown that :

(1) Color is an unsafe guide in determining the amount of carbon in an oil.

(2) The body of the oil does not determine the amount of carbon deposit. The heaviest oil that can be properly used gives the most efficient automobile lubrication.

(3) "Non-carbon" oils do not exist. Lubricating oils are a hydro-carbon product. Were all carbon eliminated, *the oil could not lubricate*. The free carbon is the only carbon that can be safely removed.

The amount of carbon deposited in the cylinders depends partly on the carburetion and gasoline combustion, partly on the oil, partly on its fitness for the car.

Unfortunately, the more the layman tries to comprehend carbon deposit, the more he is bewildered. He needs authoritative guidance.

Equipped with the experience gained from our authoritative position in lubrication, we studied every make of American automobile and many foreign makes.

We found that no one grade of lubricating oil would suit all cars. We produced our Gargoyle Mobiloils in several grades, and prepared a schedule showing the correct grade for each make of car.

The complete schedule (printed in part on the right) will be mailed you on request.

We refined and filtered these oils to remove free carbon. Aside from fur-

nishing the correct oil for each car, that is the most that any producer can do toward eliminating carbon deposit.

We can say without fear of successful contradiction, that these oils establish a world standard for automobile lubrication.



Gargoyle Mobiloils are put up in barrels, half-barrels, in 5 and 1 gallon sealed white cans. They are named :

Gargoyle Mobiloil "A"
Gargoyle Mobiloil "B"
Gargoyle Mobiloil "D"
Gargoyle Mobiloil "E"
Gargoyle Mobiloil "Arctic."

All are branded with the Gargoyle, which is our mark of manufacture. They are handled by the higher class garages, auto-supply stores and others who supply lubricants.

TO THE TRADE

By carrying Gargoyle Mobiloils, with our chart of recommendations, you can say to the driver of any car : "I can give you the correct grade of oil for your car. It is recommended by the Vacuum Oil Company — the recognized leaders in lubrication."

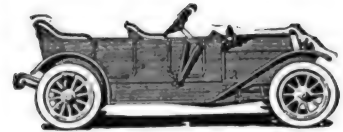
By handling Gargoyle Mobiloils you also get the benefit of the strongest advertising

campaign ever run for automobile lubricants. In addition to ten leading automobile magazines, we are running our large space advertisements in the Saturday Evening Post, Collier's, Literary Digest, Life, and Scientific American. Later we will advertise in leading monthly magazines.

VACUUM OIL CO., Rochester, U. S. A.

GENERAL SALES OFFICES, 29 BROADWAY, NEW YORK CITY

Distributing warehouses in the principal cities of the world



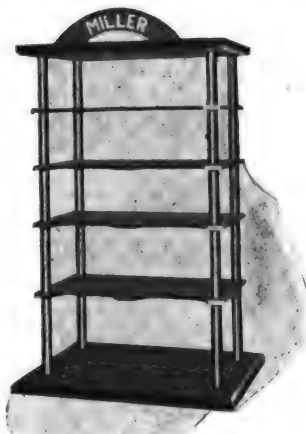
A guide to correct Automobile lubrication

Explanation : In the schedule the letter opposite the car indicates the grade of Gargoyle Mobiloil that should be used. For example, "A," means "Gargoyle Mobiloil A." "Arc." means "Gargoyle Mobiloil Arctic." For all electric vehicles use Gargoyle Mobiloil A. The recommendations cover both pleasure and commercial vehicles unless otherwise noted.

MODEL OF	1908	1909	1910	1911	1912
CARS	Summer	Winter	Summer	Winter	Summer
Abbott Detroit	Arc.	Arc.	A	Arc.	A
Aleo	A	Arc.	A	Arc.	A
American	A	Arc.	A	Arc.	A
Apperson	A	Arc.	A	Arc.	A
Atlas	A	Arc.	A	Arc.	A
Com'l	A	Arc.	A	Arc.	A
Austin	A	Arc.	A	Arc.	A
Autocar (2 cyl)	A	Arc.	A	Arc.	A
" (4 cyl)	A	Arc.	A	Arc.	A
" (2 cyl) Com'l	A	Arc.	A	Arc.	A
" (4 cyl) Com'l	A	Arc.	A	Arc.	A
Benz	A	Arc.	A	Arc.	A
Bergdoll	A	Arc.	A	Arc.	A
Brush	A	Arc.	A	Arc.	A
Buick (2 cyl)	A	Arc.	A	Arc.	A
" (4 cyl)	A	Arc.	A	Arc.	A
Cadillac (2 cyl)	A	Arc.	A	Arc.	A
" (4 cyl)	A	Arc.	A	Arc.	A
Com'l	A	Arc.	A	Arc.	A
Carters	A	Arc.	A	Arc.	A
Case	A	Arc.	A	Arc.	A
Chadwick	A	Arc.	A	Arc.	A
Chalmers	A	Arc.	A	Arc.	A
Chas.	A	Arc.	A	Arc.	A
Cole	A	Arc.	A	Arc.	A
Columbia	A	Arc.	A	Arc.	A
Columbia Knight	A	Arc.	A	Arc.	A
Coupe	A	Arc.	A	Arc.	A
Croston-Keston	A	Arc.	A	Arc.	A
Deimler	A	Arc.	A	Arc.	A
Deimler Knight	A	Arc.	A	Arc.	A
Darracq	A	Arc.	A	Arc.	A
De Dion	A	Arc.	A	Arc.	A
Delahaye	A	Arc.	A	Arc.	A
Delaney-Bellville	A	Arc.	A	Arc.	A
Elmore	A	Arc.	A	Arc.	A
E. M. F.	A	Arc.	A	Arc.	A
Flat	A	Arc.	A	Arc.	A
Flinders	A	Arc.	A	Arc.	A
Ford	A	Arc.	A	Arc.	A
Franklin	A	Arc.	A	Arc.	A
Com'l	A	Arc.	A	Arc.	A
Gramm	A	Arc.	A	Arc.	A
Gramm-Logan	A	Arc.	A	Arc.	A
Hewitt (2 cyl)	A	Arc.	A	Arc.	A
Hewitt (4 cyl)	A	Arc.	A	Arc.	A
Judson	A	Arc.	A	Arc.	A
Hupmobile	A	Arc.	A	Arc.	A
International	A	Arc.	A	Arc.	A
Interstate	A	Arc.	A	Arc.	A
Isotta	A	Arc.	A	Arc.	A
Italia	A	Arc.	A	Arc.	A
Jackson (2 cyl)	A	Arc.	A	Arc.	A
" (4 cyl)	A	Arc.	A	Arc.	A
Kelly	A	Arc.	A	Arc.	A
Kline-Kar	A	Arc.	A	Arc.	A
Com'l	A	Arc.	A	Arc.	A
Kline Kar	A	Arc.	A	Arc.	A
Kline	A	Arc.	A	Arc.	A
Kitt	A	Arc.	A	Arc.	A
Lambert	A	Arc.	A	Arc.	A
Com'l	A	Arc.	A	Arc.	A
Lancia	A	Arc.	A	Arc.	A
Locomobile	A	Arc.	A	Arc.	A
Lozier	A	Arc.	A	Arc.	A
Mack	A	Arc.	A	Arc.	A
Marion	A	Arc.	A	Arc.	A
Marmont	A	Arc.	A	Arc.	A
Matheson	A	Arc.	A	Arc.	A
Maxwell (2 cyl)	A	Arc.	A	Arc.	A
" (4 cyl)	A	Arc.	A	Arc.	A
Mercedes	A	Arc.	A	Arc.	A
Mercedes Knight	A	Arc.	A	Arc.	A
Mercer	A	Arc.	A	Arc.	A
Milner Knight	A	Arc.	A	Arc.	A
Mitchell	A	Arc.	A	Arc.	A
Moon	A	Arc.	A	Arc.	A
National	A	Arc.	A	Arc.	A
Oakland	A	Arc.	A	Arc.	A
Oldsmobile	A	Arc.	A	Arc.	A
Overland	A	Arc.	A	Arc.	A
Packard	A	Arc.	A	Arc.	A
Panhard	A	Arc.	A	Arc.	A
Panhard Knight	A	Arc.	A	Arc.	A
Peerless	A	Arc.	A	Arc.	A
Pennsylvania	A	Arc.	A	Arc.	A
Pierce Arrow	A	Arc.	A	Arc.	A
Com'l	A	Arc.	A	Arc.	A
Pope Hartford	A	Arc.	A	Arc.	A
Premier	A	Arc.	A	Arc.	A
Rambler	A	Arc.	A	Arc.	A
Rapid	A	Arc.	A	Arc.	A
Regal	A	Arc.	A	Arc.	A
Renault	A	Arc.	A	Arc.	A
Reo	A	Arc.	A	Arc.	A
Royal Tourist	A	Arc.	A	Arc.	A
Sclden	A	Arc.	A	Arc.	A
Simplex	A	Arc.	A	Arc.	A
Speedwell	A	Arc.	A	Arc.	A
Stanley	A	Arc.	A	Arc.	A
Stearns	A	Arc.	A	Arc.	A
Stearns Knight	A	Arc.	A	Arc.	A
Stevens Duryea	A	Arc.	A	Arc.	A
Stoddard Dayton	A	Arc.	A	Arc.	A
Stoddard Dayton Knight	A	Arc.	A	Arc.	A
Thomas	A	Arc.	A	Arc.	A
Walter	A	Arc.	A	Arc.	A
Welch	A	Arc.	A	Arc.	A
Welch Detroit	A	Arc.	A	Arc.	A
White (Gas)	A	Arc.	A	Arc.	A
" (Steam)	A	Arc.	A	Arc.	A
Winton	A	Arc.	A	Arc.	A

An Attractive Offer to Dealers.

In our advertising columns this month will be found one of the most attractive offers ever made in this journal to dealers, repair men and public garage owners. The Miller Rubber Co. of Akron, O., offer, with \$25.50 worth of their high quality auto accessories, comprising what they term "Assortment A," a handsome free display case as shown in the cut herewith. This case is an



This Case Free to Dealers.

ornament, besides being useful for any store or garage. It stands 26 inches high. The shelves, top and bottom, are French finished hard wood and the posts are of oxydized metal. Especially designed to show small goods to advantage, it can be used continually to keep accessories on display. One case only will be given to a dealer. "Assortment A," with which this case is given to the dealer, assorted patches, patching cement, curing solution, tubing, etc., a full list of which will be found in the advertisement before referred to. The assortment consists entirely of high



The Goods to Fill the Case.

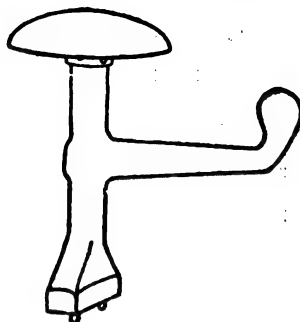
quality repair materials, easily salable to car owners. The cost to the dealer is \$25.50 and the goods amount at retail to \$45.75, thus giving the dealers a net profit of over 80 per cent., to say nothing of the free display case worth \$5.00. Readers are urged to write at once for full particulars of this great offer, which will appear but once in this journal. If you are in the vulcanizing business don't fail to write for samples and prices on repair materials. Miller repair stocks are guaranteed to give perfect results. Address all communications to Miller Rubber Co., Akron, O., and mention this magazine.

Ford Valve Grinder.

This tool was designed to meet the demand for a simple and efficient valve grinder for these cars and the sale that it has had shows us that it fills the want.

There are other grinders on the mar-

ket but this is the only one that will fit under the dash on the last valve of the "T" Ford. Leaky valves are the source of most motor trouble and if your valves are not tight you are losing power. You will be surprised to see



For Grinding Ford Valves.

how easy it is to grind your valves when you once try and you will save enough the first time to buy two grinders. Made from gray iron, nicked and highly polished. Price \$1.00. Address The Auto Parts Company, Providence, R. I.

Hot Weather Painting Suggestions.

The coming of the hot season multiplies the problems of the vehicle painter. The temperature of one hundred in the shade, with its accompanying humidity, is more distressing to him than zero weather, because the well-appointed shop can be kept warm and dry artificially, but it is harder to keep it cool and dry artificially. Heat and humidity are not the only troubles however; warm weather brings with it dust and the insect pests, which become martyrs to the cause of ruining good painting jobs.

As if these troubles were not enough, the automobile has a much harder time

speed. There is the "sand blast" from the wheels.

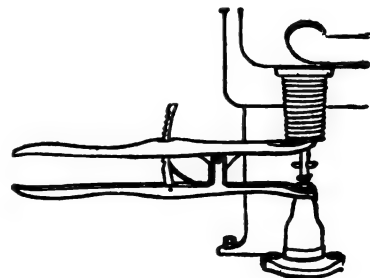
And in addition to all this, many automobile manufacturers and repairers insist on doing quicker work than was done by the old style carriage maker. These several factors made the problem of the varnish manufacturer in producing suitable finishing materials for the automobile an important and very difficult one. For several years, while this problem was fully recognized by the varnish maker, it was not actually met. It was not enough to take a quick drying varnish made on the old plan and call it automobile varnish. Such a varnish necessarily sacrificed elasticity and toughness in gaining quick and hard drying qualities. Valentine & Company have been working steadily on these problems, and they announce that their Vanadium Varnishes are distinctly automobile finishing materials, different in a number of important particulars from any of the old line varnishes and made on a distinctly different principle. Two of the Vanadium Varnishes are the result especially of struggle with the hot weather problem, plus the automobile problem. Vanadium Quick Finishing Varnish dries free from dust in an hour or two, and is ready to be run out of the shop over night. It dries very hard, but it is not in any sense they say, a brittle varnish, possessing great elasticity and durability. It has been well received by the trade.

Vanadium Chassis Finishing is more especially directed to meet that other problem which the automobile presents—hard usage, mud, grease, road oil, soapy water. This varnish also dries hard quickly, though it is not so quick as Vanadium Quick Finishing Varnish. Valentine & Company assert that it is not affected by soapy water, which, as all makers and users of varnish know, is a good deal of an assertion to make.

The July and August days are likely to witness the try-out of these materials in many shops. This will be true especially where shop space is limited and where jobs must be turned out in a hurry, yet where quality must not be sacrificed.

Valve Spring Remover.

Did you ever try to remove the valve springs on your car with a screwdriver? And did the screwdriver slip and let the spring down on your finger? The APCO Valve Spring Remover will do anything any Remover will do. It is very simple in construction, made from



Valve Remover.

malleable iron, nickel plated. Can be operated with one hand, leaving the other free to remove pin, and valve can be ground with Remover in position. Don't catch your fingers again. Price \$1.00. Address The Auto Parts Company, Providence, R. I.

Index to Advertisers.

Adamson Mfg. Co., vulcanizers.....	2d cover
Aermore Mfg. Co., signals.....	30
Alden Sampson Mfg. Co. (Sampson) automobiles.....	30
Alden Sampson Mfg. Co. (Sampson) (35) automobiles.....	30
Allen Auto Specialty Co., tire gauges.....	27
American Battery Co., storage batteries.....	30
American Bolt & Screw Case Co., revolving cases.....	18
American Electric Co., signals.....	77
American Tap & Die Co., screw plates.....	28
Allen Auto Specialty Co., tire gauges.....	27
American Battery Co., storage batteries.....	30
American Bolt & Screw Case Co., revolving cases.....	18
American Electric Co., signals.....	77
American Tap & Die Co., screw plates.....	28
American Tire & Rubber Co., cement.....	27
Armiger Chemical Co., polish.....	94
Arsenal Varnish Co., varnish.....	14
Atlantic Machine Co., timer brackets.....	99
Atlas Auto Supply Co., repair outfits.....	88
Atlas Chain Co., tire chains.....	102
Atwater Kent Mfg. Works, ignition.....	84
Auburn Auto Pump Co., pumps.....	99
Automizer Co.....	30
Automobile Advertising Co., advertising service.....	8
Automobile Supply Mfg. Co., signals.....	99
Automobile Tire Co., tires.....	25
Auto Directories Co., mailing lists.....	24
Auto Parts Mfg. Co. (Milwaukee, Wis.) supplies.....	8
Auto Parts Co. (Providence, R. I.) supplies.....	81
Auto-Tire Vulcanizing Co., vulcanizers.....	20
Baldwin Chain & Mfg. Co., chains.....	14
Bancroft, J. E., vulcanizers.....	81
Barnes Drill Co., lathes.....	99
Barnes, W. F., & John Co., lathes.....	100
Battershall, F. W. & Co., gaskets.....	29
Benford Mfg. Co., timers and spark plugs.....	75
Best Ignition Equipment Co., spark plugs.....	32
Blackburn Specialty Co., locks.....	80
Blackledge, John W., Mfg. Co., springs.....	26
Blickenderfer, G. C., spark plug.....	26
Borbein Auto Co., bodies.....	101
Breakstone, S., locks.....	13
Brennan Motor Mfg. Co., motors.....	99
Brieston Mfg. Co., treads.....	90
Bridgeport Brass Co., pumps.....	97
Brilliant Gas Lamp Co., gasoline lighting system.....	102
Brown Co., pumps.....	82
Brush Runabout Co., automobiles.....	30
Buckeye Sales Co., vulcanizers.....	95
Buffalo Forge Co., tools.....	31
Buffum Tool Co., tools.....	14
Buob & Scheu, auto tops.....	102
Burke Valve Co., valves.....	80
Butterfield & Co., screw plates.....	16
Candy-Otto Mfg. Co., tools.....	9
Canton Foundry & Machine Co., turntables and jacks.....	6
Cartercar Co., automobiles.....	96
Catalain, A. G., hose clamps.....	102
Champion Blower & Forge Co., tools.....	20
Champion Spark Plug Co., spark plugs.....	100
Clarke Carter Automobile Co., automobiles.....	100
C-M-B Wrench Co., wrenches.....	97
Colorado Tire & Leather Co., treads.....	3
Columbia Motor Car Co., automobiles.....	30
Comstock, Geo. S., compressors.....	100
Conover & Robinson, wind shields.....	100
Courier, automobiles.....	30
Cray Bros., supplies.....	23
Crone, F. G., pumps.....	29
Curtis & Co., Mfg. Co., pumps.....	14
Davis Robe & Armor Co., treads.....	97
Dayton Motor Car Co., automobiles.....	30
Diamond Rubber Co., of N. Y., tires, tire stock.....	21
Dixon, Joseph, Crucible Co., lubricants.....	77
Double-Fabric Tire Co., tire lining.....	85
Dover Stamping & Mfg. Co., funnels.....	96
Draver Mfg. Co., cable supports.....	97
Duryea, C. D., Motor Co., automobiles.....	26
Endura Mfg. Co., packing.....	104
Eureka Auto Parts Mfg. Co., radiators.....	30
Excelsior Tire Co., tires.....	10
Fairbanks Morse & Co., compressors.....	77
Felton Sibley & Co., varnishes.....	16
Firestone Tire & Rubber Co., tire stock.....	91
Fisher & Norris, vises.....	24
Frontier Tire & Rubber Co., tires.....	67
Garage Equipment Mfg. Co., supplies.....	99
Gardner Governor Co., air compressors.....	77
Gardner Engine Starter Co., trusses.....	19
Geisler Bros., storage batteries.....	29
Gem City Liquid Vulcanizer Co., repair outfits.....	28
Gibney, Jas. L., & Bro., vulcanizers.....	102
Gilmer, Jr., G. Walker, pillars.....	78
Goodrich, B. F., Co., tires.....	97
Grant, H. M., fibre.....	97
Grant-Hawley Mfg. Co., cutouts.....	28
Gray Specialty Co., reliners.....	101
Great American Rubber Co., tires.....	102
Grossman, E., Co., spark plugs.....	100

Guide Motor Lamp Mfg. Co., lamps.....	84
Gun Metal Finish Co., polish.....	24
Gwyn-Bacon Vulcanizer Co., vulcanizers.....	81
Hagstrom Bros. Mfg. Co., spark plugs.....	25
Haight Auto Lighter Co., ignition.....	29
Harris, A. W., Oil Co., oil.....	97
Harris Oil Co., oil.....	26
Hart & Widder Co., pumps.....	97
Haws, Geo. A., oil.....	2d cover
Hawthorne Mfg. Co., pumps.....	100
Haywood Tire & Equipment Co., vulcanizers.....	28
Hemmeter Spark Gap Mfg. Co., spark gaps.....	30
Hess-Bright Mfg. Co., ball bearings.....	5
Hickok Mfg. Co., monograms.....	84
Hinckley Machine Works, milling attachments.....	28
Hodge & Graves Co., automobile seats.....	75
Holzman Auto Supply Co., supplies.....	97
Horsey Mfg. Co., patches.....	16
Hub Machine Welding & Contracting Co., welding.....	99
Hudson Motor Car Co., automobiles.....	77
Hull, R. C., Electric Co., ignition.....	95
Inner Shoe Tire Co., tire lining.....	7
Inst. Lighter Co., ignition.....	100
Jeffrey-Dewitt Co., spark plugs.....	94
Johns, H. W., Manville Co., asbestos fabrics and specialties, storage batteries.....	25
Johnston, R. E., Paint Co., paints.....	12
Jones, Phineas & Co., wheels.....	24
Keegan, Frank W., springs.....	97
Kellom, Chas. F. & Co., oil.....	24
Kimball Tire Case Co., treads.....	103
K-W Ignition Co., magnetos and spark coils.....	98
K. W. Mfg. Co., tire lining.....	15
Kron, C. Z., Mfg. Co., tops.....	30
Leather Tire Goods Co., treads.....	1
Lee Tire & Rubber Co., signals.....	19
Liberty Rubber Co., repair outfits.....	27
Livingston Radiator & Mfg. Co., radiators.....	76
Lobe Pump & Machinery Co., pumps.....	100
McGill Mfg. Co., lamps.....	96
McGill & Enck Mfg. Co., gloves.....	28
McIntyre, W. H., Co., automobiles.....	30
McLain, H. E. & Co., tire chains.....	77
Maxwell-Briscoe Motor Co., automobiles.....	30
Mayo Mfg. Co., pumps.....	82
M. & M. Mfg. Co., repair outfits.....	94
Meeker Mfg. Co., wheels.....	97
Mendenhall, C. S., road maps.....	30
Metal Body Tank & Fender Co., supplies.....	96
Michener, E. S., carbon remover.....	103
Miller, Chas. E., vulcanizers.....	6
Miller Rubber Co., supplies.....	2
Model Gas Engine Works, motors.....	4
Modern Automatic Appliance Co., steering device.....	97
Moller Bros. Controller & Economizer Co., fuel economizer.....	22
Moore, J. C. & Co., packs.....	77
Morris, R. W. Mfg. Co., polish.....	23
Mosler, A. R. & Co., spark plugs.....	69
Mossberg, Frank & Co., wrenches.....	2
Motor & Mfg. Works Co., valves.....	75
Motz Tire & Rubber Co., tires.....	102
National Gas Engine Starter Co., engine starters.....	39
National Motor Supply Co., vulcanizers.....	Front cover
National Sales Corporation, brake band lining.....	100
New York Coil Co., ignition.....	79
New York & New Jersey Lubricant Co., oil.....	93
Northwestern Chemical Co., cement.....	18
Oakland Advertising Co., rubber novelties.....	102
Ofeldt, F. W. & Son, boilers.....	97
O'Neil Tire & Protector Co., vulcanizers.....	102
Packard Electric Co., ignition cables.....	84
Page Lester Co., repair outfits.....	26
Peerless Accessories Mfrs., pumps.....	103
Perfect Mfg. Co., vehicle washers.....	102
Phillips-Lafitte Co., brazing compounds.....	29
Pitner Pump Co., pumps.....	82
Planhard Mfg. Co., carburetors.....	96
Porter, H. K., bolt clippers.....	102
Prest-O-Lite Co., tanks, tubes.....	86
Queen Mfg. Co., treads.....	11
Randall-Fachney Co., signals, terminals, spark plugs.....	21, 29
R-C-H Corporation, automobiles—4th cover.....	
Remy Electric Co., magnetos.....	24
Richardson Tire Co., repair outfits.....	82
Rie Nie Mfg. Co., radiator compound.....	80
Robinson, Wm. C. & Sons Co., oil.....	31
Royal Equipment Co., brake band lining.....	4
Rub-On Varnish Co., varnish.....	29
Sager, J. H., Co., shock absorber.....	100
Sampson, automobiles.....	30
Scaife, Wm. B., & Sons Co., gasoline outfits.....	103
Schrader's A., Son, tire gauges.....	32
Sealo Tire Co., cement.....	83
Sebastian Lathe Co., lathes.....	22
Security Co., patches.....	102
Seneca Falls Mfg. Co., lathes.....	24
Shaler, C. A., Co., vulcanizers.....	92
Shannon, T. R., polish.....	103

Sharp Spark Plug Co., spark plugs.....	32
Sparkler Mfg. Co., varnish.....	102
Splitdorf, Electrical Co., magnetos.....	12
Standard Brass & Iron Works, bumpers.....	102
Standard Woven Fabric Co., brake band lining.....	21
Stanley, John T., soap.....	101
Star Vulcanizer Mfg. Co., vulcanizers.....	19
Steam Carriage Boiler Co., boilers.....	97
Stoddard-Dayton, automobiles.....	30
Sturdy Mfg. Co.....	27
Superior Motor Specialty Co., spark plugs.....	97
Sypher Mfg. Co., tools.....	26
35 Per Cent. Automobile Supply Co., supplies.....	77
Times Square Automobile Co., automobiles.....	21
Tingley, C. O. & Co., patches.....	26
Tobey, Wm. L., rim removers.....	26
Toledo Auto Devices Co., putty.....	102
Triple-Tread Mfg. Co., treads.....	87
Triumph Chemical Co., varnish.....	100
Troy Auto Specialty Co., pumps.....	84
Tuthill Spring Co., springs.....	102
20th Century Tire Protector Co., treads.....	83, 104
Underwood, H. B., & Co., cylinders re-bored.....	10
United States Motor Co., automobiles.....	30
United States Tire Co., tires.....	102
Universal Tire Protector Co., treads.....	23
Vacuum Oil Co., oil.....	71
Valentine & Co., varnishes.....	26
Vanderpool, Tire & Rubber Co., tires.....	102
Vanguard Mfg. Co., wind shield.....	100
Voorhees Rubber Mfg. Co., tire lining.....	29
Waban Webbing Co., tire lining.....	78
Ward, Edgar T., & Sons, spring winders, tubing.....	96, 101
Waterbury Welding Co., welding.....	16
Watres Mfg. Co., signals.....	22
Western Automobile Supply Co., inner casing.....	31
Western Motor Co., motors.....	97
Western Robe Mills, buggy washers.....	19
Western Welding & Mfg. Co., welding.....	24
Wiley & Russell Mfg. Co., screw plates, tools.....	102
Williams Foundry & Machine Co., repair outfits.....	18
Williams, J. H., & Co., drop forgings.....	17
Winchester Machine Works, tools.....	101
Woven Steel Hose & Rubber Co., brake band lining.....	100
Zacharias, E. H., motors.....	26

Classified Buyers' Guide.

Advertising Service	
Automobile Advertising Co.....	8
Air Compressors	
Gardner Governor Co.....	77
Williams Foundry & Machine Co.....	18
Aluminum Cases Repaired	
Hub Machine Welding & Contracting Co.....	99
Waterbury Welding Co.....	16
Aluminum Welding Composition	
Hub Machine Welding & Contracting Co.....	99
Waterbury Welding Co.....	16
Asbestos Fabrics and Specialties	
Johns, H. W., Manville Co.....	25
Automobiles	
Alden Sampson Mfg. Co. (Sampson 35).....	30
Alden Sampson Mfg. Co. (Sampson).....	30
Brush Runabout Co.....	30
Cartercar Co.....	96
Clarke Carter Automobile Co.....	100
Columbia Motor Car Co.....	30
Courier.....	30
Dayton Motor Car Co.....	30
Duryea, C. D., Motor Co.....	26
Hudson Motor Car Co.....	77
Maxwell-Briscoe Motor Co.....	30
McIntyre, W. H., Co.....	30
R-C-H Corporation.....	4th cover
Times Square Automobile Co.....	21
United States Motor Co.....	30
Automobile Seats	
Hodge & Graves Co.....	75
Ball Bearings	
Hess-Bright Mfg. Co.....	5
Bodies	
Borbein Auto Co.....	101
Boilers	
Ofeldt, F. W. & Son.....	97
Steam Carriage Boiler Co.....	97
Williams Foundry & Machine Co.....	18
Bolt Clippers	
Porter, H. K.....	102
Brake Band Lining	
Johns, H. W., Manville Co.....	25
National Sales Corporation.....	100
Royal Equipment Co.....	4
Standard Woven Fabric Co.....	21
Woven Steel Hose & Rubber Co.....	100

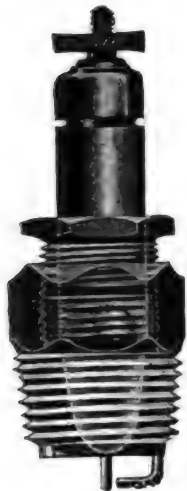
Bracing Compounds Phillips-Lafitte Co. 29	Magnetos K-W Ignition Co. 98 Splitdorf Electrical Co. 12	Signals Aermore Mfg. Co. 30 American Electric Co. 77 Automobile Supply Mfg. Co. 99 Lee Tire & Rubber Co. 19 Randall-Faichney Co. 21 Troy Auto Specialty Co. 84 Watres Mfg. Co. 22
Bracing Powders Phillips-Lafitte Co. 29	Maps Mendenhall, C. S. 30	Spark Plugs Benford Mfg. Co. 75 Best Ignition Equipment Co. 32 Blickensderfer, G. C. Co. 20 Champion Spark Plug Co. 100 Grossman, E., Co. 100 Hagstrom Bros. Mfg. Co. 25 Jeffrey-Dewitt Co. 94 Mosier, A. R. & Co. 69 Randall-Faichney Co. 21 Sharp Spark Plug Co. 32 Superior Motor Specialty Co. 97
Buggy Washers Western Robe Mills 19	Milling Attachments Hinckley Machine Works 28	Springs Blackledge, John W., Mfg. Co. 26 Keegan, Frank W. 97 Tuthill Spring Co. 102
Bumpers Standard Brass & Iron Works 102 Troy Auto Specialty Co. 84	Monograms Hickok Mfg. Co. 84	Spring Winders Ward, Edgar T., & Sons. 96, 101
Cable Support Draver Mfg. Co. 97	Motors Brennan Motor Mfg. Co. 99 Model Gas Engine Works 4 Western Motor Co. 97 Zacharias, E. H. 26	Steam Packings Johns, H. W. Manville Co. 25
Carbon Removers Michener, E. S. 103 Northwestern Chemical Co. 18 Prest-O-Lite Co. 86	Non-Conducting Coverings Johns, H. W. Manville Co. 25	Steering Devices Modern Automatic Appliance Co. 97
Carburetors Planhard Mfg. Co. 96	Oil Gauges Troy Auto Specialty Co. 84	Storage Batteries American Battery Co. 30 Gelscher Bros. Storage Battery Co. 29 Johns, H. W. Manville Co. 25
Cement American Tire & Rubber Co. 27 Northwestern Chemical Co. 18 Sealo Tire Co. 83	Oils Harris Oil Co. 26 Harris, A. W., Oil Co. 97 Haws, Geo. A. 2d cover Kellom, Chas. F. & Co. 24 New York & New Jersey Lubricant Co. 93 Robinson, Wm. C. & Son Co. 31 Vacuum Oil Co. 71	Supplies Auto Parts Mfg. Co. (Milwaukee, Wis.) 8 Auto Parts Co. (Providence, R. I.) 81 Cray Bros. 23 Garage Equipment Mfg. Co. 99 Holzman Auto Supply Co. 97 Metal Body Tank & Fender Co. 96 Miller Rubber Co. 7 35 Per Cent. Automobile Supply Co. 22
Chains Baldwin Chain & Mfg. Co. 14	Packing Endura Mfg. Co. 104	Tanks Prest-O-Lite Co. 86
Clutches Williams Foundry & Machine Co. 18	Paints Johnston, R. F., Paint Co. 12	Timers Benford Mfg. Co. 75
Compressors Comstock, Geo. S. 100 Fairbanks Morse & Co. 77	Patches Gray Specialty Co. 101 Horsey Mfg. Co. 16 Security Co. 102 Tingley, C. O., & Co. 26	Timer Brackets Atlantic Machine Co. 99
Cutouts Gray-Hawley Mfg. Co. 28	Pliers Gilmer, Jr., G. Walker 78	Tire Chains Atlas Chain Co. 102 McLain, H. E. & Co. 77
Cylinders Bored Underwood, H. B., & Co. 10	Polish Armiger Chemical Co. 94 Gun Metal Finish Co. 24 Morris, R. W., Mfg. Co. 23 Shannon, T. R. 103	Tire Gauges Allen Auto Specialty Co. 27 Schraeder's, A., Son 32
Detachable Treads Leather Tire Goods Co. 1	Pumps Auburn Auto Pump Co. 99 Bridgeport Brass Co. 97 Brown Co. 82 Crone, F. G. 29 Curtis & Co., Mfg. Co. 14 Gardner Governor Co. 77 Hart & Widder Co. 97 Hawthorne Mfg. Co. 100 Lobee Pump & Machinery Co. 100 Mayo Mfg. Co. 83 Peerless Accessories Mfrs. 103 Pitner Pump Co. 82 Prest-O-Lite Co. 86 Troy Auto Specialty Co. 84	Tires Automobile Tire Co. 25 Diamond Rubber Co. of N. Y. 21 Excelsior Tire Co. 10 Frontier Tire & Rubber Co. 67 Goodrich, B. F. Co. 97 Great American Rubber Co. 102 Motz Tire & Rubber Co. 102 United States Tire Co. 102 Vanderpool, W. 102
Directories Auto Directories Co. 24	Putty Toledo Auto Devices Co. 102	Tire Lining Double-Fabric Tire Co. 85 Inner Shoe Tire Co. 1 K. & W. Mfg. Co. 15 Voorhees Rubber Mfg. Co. 29 Waban Webbing Co. 78
Drop Forgings Williams, J. H., & Co. 17	Radiators Eureka Auto Parts Mfg. Co. 30 Livingston Radiator & Mfg. Co. 76	Tire Kettles Williams Foundry & Machine Co. 18
Electrical Supplies Johns, H. W., Manville Co. 25 Grant, H. M. 97	Radiator Compounds Rie Nie Mfg. Co. 80	Tire Molds Williams Foundry & Machine Co. 18
Engine Starters National Gas Engine Starter Co. 89	Radiators Repaired Livingston Radiator & Mfg. Co. 76	Tire Repair Equipment Williams Foundry & Machine Co. 18
Fire-Proof Cements Johns, H. W. Manville Co. 25	Rollers Gray Specialty Co. 101	Tire Stock Diamond Rubber Co. of N. Y. 21 Firestone Tire & Rubber Co. 91
Friction Clutches Williams Foundry & Machine Co. 18	Repair Outfits Atlas Auto Supply Co. 88 Gem City Liquid Vulcanizer Co. 28 Gray Specialty Co. 101 Liberty Rubber Co. 27 M. & M. Mfg. Co. 94 Page-Lester Co. 26 Richardson Tire Co. 82 Williams Foundry & Machine Co. 18	Tools Buffalo Forge Co. 31 Buffum Tool Co. 14 Canedy-Otto Mfg. Co. 9 Champion Blower & Forge Co. 20 Sypher Mfg. Co. 26 Wiley & Russell Mfg. Co. 102 Winchester Machine Works 101
Fuel Economizers Maller Bros. Controller & Economizer Co. 22	Re-Treading Rings Williams Foundry & Machine Co. 18	Top Dressing (auto) Felton, Sibley & Co. 16
Funnel Dover Stamping & Mfg. Co. 96	Revolving Cases American Bolt & Screw Case Co. 18	Tops Buob & Scheu 102 Kroh, C. Z., Mfg. Co. 30
Gaskets Battershall, F. W., & Co. 29	Rim Removers Tobey, Wm. L. 26	Treads Britson Mfg. Co. 90 Colorado Tire & Leather Co. 3 Davis Robe & Armor Co. 97 Klimball Tire Case Co. 103 Leather Tire Goods Co. 11 Queen Mfg. Co. 11 Triple-Tread Mfg. Co. 87 20th Century Tire Protector Co. 83, 104 Universal Tire Protector Co. 23
Gasoline Lighting System Brilliant Gas Lamp Co. 102	Roofing and Building Materials Johns, H. W., Manville Co. 25	
Gasoline Storage Outfits Scaife, Wm. B., & Sons Co. 103	Rubber Novelties Oakland Advertising Co. 102	
Gloves McHose & Enck Mfg. Co. 28	Screw Plates American Tap & Die Co. 28 Butterfield & Co. 16 Wiley & Russell Mfg. Co. 102	
Hose Clamps Catelain, A. G. 102	Shock Absorbers Sager, J. H., Co. 100	
Ignition Atwater Kent Mfg. Works 84 Haight Auto Lighter Co. 29 Hull, R. C., Electric Co. 95 Inst. Lighter Co. 100 New York Coil Co. 79 Packard Electric Co. 84	Soaps Stanley, John T. 101	
Inner Casing Western Automobile Supply Co. 31	Spark Gaps Hemmeter Spark Gap Mfg. Co. 30	
Jacks Moore, J. C., & Co. 77		
Lamps McGill Mfg. Co. 96		
Lamps (side and tall) Guide Motor Lamp Mfg. Co. 84		
Lathes Barnes Drill Co. 99 Barnes, W. F. & John Co. 100 Sebastian Lathe Co. 22 Seneca Falls Mfg. Co. 24		
Locks Blackburn Specialty Co. 80 Breakstone, S. 13		
Lock Washers K.W. Ignition Co. 94 Remy Electric Co. 24		
Lubricants Dixon, Joseph, Crucible Co. 77		
Mailing Lists Auto Directories Co. 24		

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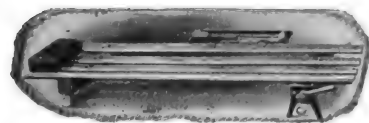


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Tubes Prest-O-Lite Co. 86	Vulcanizers Adamson Mfg. Co. 3d cover	Welding Powders Phillips-Laffitte Co. 29
Tubing Ward, Edgar T., & Sons.....96, 101	Auto Tire Vulcanizing Co. 20	Wheels Jones, Phineas & Co. 24
Turntables Canton Foundry & Machine Co. 6	Bancroft, J. E. 81	Meeker Mfg. Co. 97
Valves Burke Valve Co. 80	Buckeye Sales Co. 95	Wind Shields Conover & Robinson 109
Varnishes Arsenal Varnish Co. 14	Gibney, Jas. L. & Bro. 102	Grossman, E., Co. 100
Felton, Sibley & Co. 16	Gwyn-Bacon Vulcanizer Co. 81	Vanguard Mfg. Co. 100
Rub-On Varnish Co. 29	Haywood Tire & Equipment Co. 28	Wind Shield Glass Cleaners Grossman, E., Co. 100
Sparkler Mfg. Co. 102	Miller, Chas. E. 6	Wrenches C. M. B. Wrench Co. 97
Valentine & Co. 25	National Motor Supply Co. Front cover	Mossberg, Frank, & Co. 2
Triumph Chemical Co. 100	O'Neil Tire & Rubber Co. 102	
Vehicle Washers Perfect Mfg. Co. 102	Shaler, C. A., Co. 92	
Vises Fisher & Norris 24	Star Vulcanizer Mfg. Co. 19	
	Williams Foundry & Machine Co. 18	
	Welding Hub Machine Welding & Contracting Co. 99	
	Waterbury Welding Co. 16	
	Western Welding & Mfg. Co. 24	
	Welding by Electricity Hub Machine Welding & Contracting Co. 99	

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TEDDY TETZLAFF

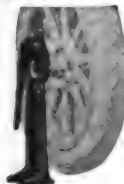
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The great specialists of the automobile industry, working under the direction of Howard E. Coffin, have created the New Hudson "37," electric self-cranking and electric-lighted. There is no movement in operating this car which cannot be accomplished from the driver's seat. Write for further facts about the "37." **HUDSON MOTOR CAR CO., 7363 Jefferson Ave., Detroit, Mich.**



Moore Tire Saving Jacks
Relieve the tires from weight of the car—prevent weak spots that come from tires standing on oily garage floors. Small boy can jack up car in half-minute—easy—ship loop over hub and push down the lever—\$6.50 per set of four prepaid. Will cut your tire bills in half.

Double the Life of Your Tires

J. C. MOORE & CO., 306 Wisconsin St., Racine, Wis.

HARRIS M. HANSUE

Writes: "Lubrication is simply perfect. I can hardly express myself as to the satisfaction obtained from the use of Dixon's Automobile Lubricants."

"Lubricating The Motor" and Sample No. 184-G on request.

JOSEPH DIXON CRUCIBLE CO.
Jersey City, N. J.



GARDNER GARAGE PUMPS

The most popular pump on the market. Get our catalog and Special proposition.

THE GARDNER GOVERNOR CO.
Station R, Quincy, Ill.



Automobile Owner

If you are tired paying the usual high list prices for Auto Supplies, write for our 35% catalog.

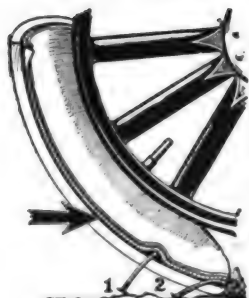
35% AUTOMOBILE SUPPLY CO.

97 Chambers St., New York
1508 Michigan Ave., Chicago, Ill.
236 Peachtree St., Atlanta, Ga.



Subscribe to the "Automobile Dealer and Repairer," \$1.00 Per Year.

Please mention the Automobile Dealer and Repairer when writing to advertisers.



1. Shows webbing taking nail.
2. Turning nail.

PROTECT THE INNER TUBE

As long as the inner tube is strong and inflated you have no tire troubles nor anxiety on the road.

Waban Webbing—a heavy woven webbing placed between inner tube and casing—takes and turns nails or other objects that pierce the shoe. Puncture is practically impossible under all conditions of use. The added strength reduces the possibility of blow-outs.

Waban Webbing "BULLET PROOF"

has no bias places to pinch—will not heat—conforms to shape of tire. It gives protection where it is needed. Easily inserted in a few minutes.

PRICES, delivered to any address, charges prepaid (for one tire):

28 x 3 or 3½	\$2.00	32 x 4	\$2.70	34 x 4½	\$3.15
30 x 3½	2.15	32 x 4½	3.00	36 x 4	2.95
30 x 4	2.40	34 x 3½	2.50	36 x 4½	3.25
32 x 3½	2.40	34 x 4	2.85		

Write for new booklet, "Lengthen the Life of Your Tires."

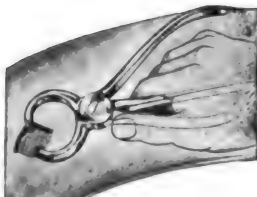
WABAN WEBBING CO., 207 Essex Street, Boston, Mass.



The Average Man Can't Afford to Own An Automobile Because of Tire Cost

The following figures, based on the latest tire list, figured on equipment of four tires and tubes, show that a larger proportion of your original investment in a car is represented by tires than any other one part of the car. Now look in your tool kit and see what the manufacturer does to help you *save that investment*. The average tire tool kit consists entirely of tools for the removal of tires and *nothing with which to repair them*.

Size	Four Tires and Tubes	Cost Per Mile
30 x 3½	\$112.60	3.2 cts.
32 x 3½	119.60	3.11 cts.
32 x 4	168.20	4.8 cts.
34 x 4	179.20	5.1 cts.
36 x 4½	244.00	6.97 cts.
38 x 4½	256.60	7.3 cts.
40 x 5½	379.90	10.85 cts.



(Patented)

The average tire is guaranteed for only 3500 miles, therefore your tire expense figures out according to this list.

The majority of the CAR MANUFACTURERS assure me that they believe that in another year they will be *forced by demand* to put GILMER TIRE REPAIR PLIERS in their kit, but that they will *not put them in* until they are *forced to* by demands from their customers. These same manufacturers are about the loudest in their claims of service to the owner, *yet on their own admission they only serve the owner when he makes them*.

Put GILMER TIRE REPAIR PLIERS in your kit.

10,000 Miles of Service

are built into every good tire made—but 99 times in 100 over one-half of that mileage escapes through small cuts, which could be repaired in a few seconds time. This accounts for the fact that tire manufacturers guarantee their tires for only 3500 miles.

The strength of the tire is dependent entirely on the fabric. In nearly every instance where a tire blows out, a close inspection will show that it is due to the neglect of a small cut or puncture which let in dirt, grease and dampness to rot the fabric. Every argument for the repair of tires is an argument for the use of GILMER TIRE REPAIR PLIERS, since no matter how good the gum you use, its efficiency depends on getting it into the cut, NEXT TO THE FABRIC.

If your tire dealer does not carry these, send me his name and \$1.00 for a pair of nickel plated pliers and cleaner. Satisfaction guaranteed. Never a complaint. Customers say, "Best thing on the market for cutting automobile expense." "Will do all you claim." "Every car owner should have a pair." Copy of "Tire Insurance" sent on request.—"Good News for Auto Owners"

G. WALKER GILMER, Jr., Manufacturer,
50 No. 7th Street, Philadelphia, Pa., U. S. A.

For sale at all of Charles E. Miller's fifteen stores.
Also by St. Louis Rubber Cement Co., St. Louis, Mo.

Sole Agent for Great Britain, T. W. Rickard, 45 Gasmere Road, Muswell Hill, London, N.

Cuts Trouble and Expense in Half.—The Harris Oil Company, 600 Mulberry street, Muncie, Ind., state in their advertisement in this issue that Harris Autoil will cut the troubles of motorists in half. This oil the manufacturers say is made from Premium, Pa., Crude and does not foul the plugs or leave carbon deposits. They want to send a sample package with a booklet to every one of our readers who may be interested.

Seamless Steel Tubing.—Edgar T. Ward & Sons, 25 Purchase street, Boston, Mass., would like to correspond

with any of our readers interested in seamless steel tubing. They have over 1,000,000 feet on hand in 1,500 sizes. Send for their price list and full particulars.

Perfection Spring Winder.—Edgar T. Ward & Sons, 25 Purchase street, Boston, Mass., have an announcement in this issue with an illustration of their Perfection Spring Winder, which they say has been adopted by leading manufacturers and machinists as standard for precision winding of extension compression and torsion springs. This de-

vice the manufacturers say will pay for itself in one day's use. But consult the advertisement of this company and in writing for further particulars mention The Automobile Dealer and Repairer.

Henry E. Eby, Jr., of Fernwood, Pa., sole owner of the formula for the rubber cement in tubes, previously sold under the name of the Quality Rubber Cement has gone in business for himself and is putting his preparation on the market under the name of the Globe Rubber Cement.

If your car is equipped with vibrating coils, our

RHOADES' IGNITION SYSTEM



will surely interest you. By installing this system (which is easily accomplished without machine work) your car will pull hills that will



surprise you, show a remarkable increase in speed and be entirely free from Ignition troubles, equal or superior to the best high tension magneto, and best of all six dry cells furnish current for 2000 to 3000 miles running. We will make you a liberal allowance on your old system. Write for our exchange proposition, give size and direction of time shaft, number of cylinders, make and model of car.

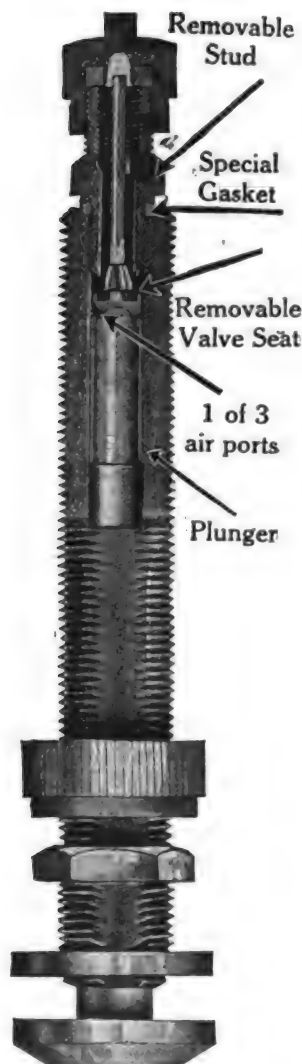


Our MASTER VIBRATOR FOR FORD CARS

is not only the Pioneer but is positively the only instrument giving perfect satisfaction with the Ford magneto. Advantages are perfect timing, but one adjustment for any number of cylinders, regularity of firing, and reasonable in price. **Our policy to all:** If, after trial, goods are not satisfactory, purchase price will be promptly refunded.

NEW YORK COIL COMPANY
4 DOVER STREET
NEW YORK, N. Y.

How the BURKE Valve Cuts Off Two-thirds the Time and Labor of Tire-pumping



Your tires *must* be kept properly inflated. No matter how good the tire, every manufacturer insists upon proper inflation as the prime requisite to the life or mileage of his product.

BURKE Valves make proper inflation quick and easy. Quicker ; because of three times greater capacity to transmit air into the inner tube. Easier ; because there is no spring resistance to overcome in charging the tube.

Other valves are spring closed, creating an average of 20 lbs. to the square inch resistance to the charging pressure. This means that when you use a pump having a piston area of 2 square inches, you must exert 40 lbs. extra pressure at each stroke before you can even begin to get air into the tube. As it takes over 100 strokes to inflate the average tire, that's 4000 lbs. extra labor. Think what that means.

The BURKE Valve eliminates all this two tons of extra labor, for it has no spring resistance whatever. Being a "balanced" valve, the pressure inside the tube always equals that in the pump chamber. The air pressure within the tube closes the valve automatically, making it air-tight at only a few pounds pressure. Hence no springs are required.

These features cut off two-thirds the time and labor of tire-pumping.

TO DEFLATE, just hold the plunger down. There is ample capacity to deflate any inner tube in less time than required to remove the parts of other valves—and no risk of losing the parts.

STANDARD AND UNIVERSAL

BURKE Valves are standard as to size, and their parts are universally interchangeable on all our types for automobiles, motorcycles and bicycles.

Furthermore, as the stud or end section of any valve is the part most likely to become battered or damaged, we make BURKE Valves so these parts can be removed and new ones substituted without touching the inner tube. This feature saves the valve and the time and expense of a new one.

After rigid tests, many automobile manufacturers have already adopted BURKE Valves as part of their 1912 and 1913 tire equipment.

AUTO OWNERS: Demand BURKE Valves on your inner tubes. If your Dealer does not carry them, write us for "BOOKLET A," and we will see that you are supplied.

TIRE DEALERS AND REPAIRMEN: You can readily see the tremendous selling points of BURKE Valves. Write at once for our "BOOKLET A" and price list.

THE BURKE VALVE CO.,

233 The Arcade, CLEVELAND, O.



STOLEN AUTOS

PREVENTED WITH OUR AUTOLOCK SWITCH

Put on coil or dash in ten minutes. Price \$5.00.

Money Back Guarantee.

Write now, giving name, year, and ignition of your car.

BLACKBURN SPECIALTY CO.

1124 Prospect Ave., S. E.
CLEVELAND OHIO



Chemical Accessories
For the Motor Car

Dealers: Send for FREE BOOK—
How Enamel Can Be Used Successfully in Garages.

Catalog A describes our full line of Hard Rubber Air Drying Enamels for Brass Fixtures, Cylinders, Tops and Seat Cushions. Mohair Waterproofing, Mohair Top Cleaner and Valve Grinding Compound.

RieNie Manufacturing Co.,
Minneapolis, Minn. U. S. A.

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Why not take a VULCAR with you on that trip to repair your tires and tubes.

It will save you time, trouble and expense.

You can vulcanize your tires or tubes anywhere on the road. You can vulcanize your extra inner tubes while the car is running. After placing the tire or tube in position on the vulcanizer, just light and in twenty minutes you have a perfect job of vulcanizing.

VULCAR is the only portable vulcanizer which supplies moisture to the rubber while it is being vulcanized, thus preventing burning or over-vulcanizing of the rubber.

In wooden box - - - - - \$12.50
In attractive leather case with extra supplies, - 15.00

THE NEW PROCESS VULCANIZER

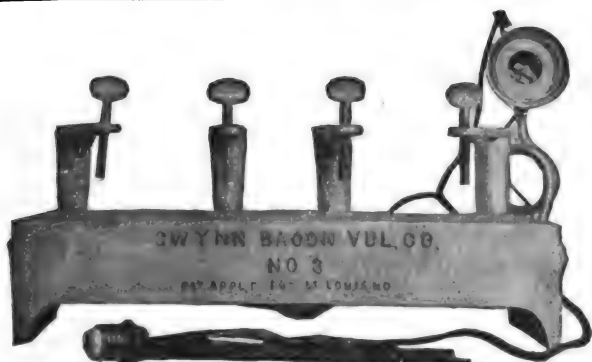
J. E. BANCROFT, Manager

665-669 Spring Street, Toledo, Ohio, U. S. A.

EUREKA

"I have found it"

An AUTOMATIC ELECTRIC STEAM VULCANIZER



The Gwynn-Bacon Automatic Steam Vulcanizer is the only Electrically heated vulcanizer that uses steam, and is automatic in its operation.

Absolutely guaranteed not to burn a tube or require watching.

Written guarantee for one year that it will never cause you any trouble.

Made in three sizes—for the private owner, for the small Garage and for the Garage doing a large business in tube repairing.

We also make glue pots that have the same Automatic control, that will keep the glue at an even temperature at all times, thereby saving in a year's time several times its initial cost.

Send for Catalogue of prices and terms, with copy of guarantee.

Ask your Dealer or write to

GWYNN-BACON VULCANIZER CO., 1456 Goodfellow Ave., St. Louis, Mo.

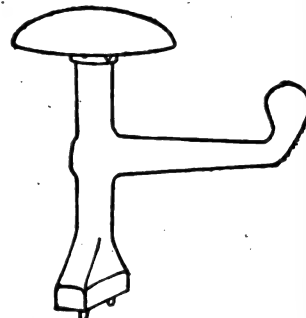
FORD OWNERS



FORD VALVE GRINDER

This tool was designed to meet the demand for a simple and efficient valve grinder for these cars and the sale that it has had shows us that it fills the want.

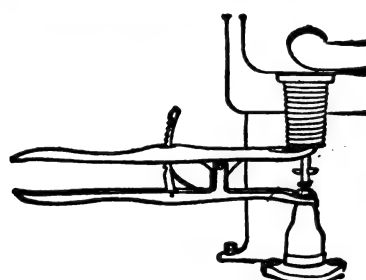
There are other grinders on the market but this is the only one that will fit under the dash on the last valve of the "T" Ford. Leaky valves are the source of most motor trouble and if your valves are not tight you are losing power. You will be surprised to see how easy it is to grind your valves when you once try and you will save enough the first time to buy two grinders. Made from gray iron, nickered and highly polished.



PRICE - - - \$1.00
POSTPAID



VALVE SPRING REMOVER




Did you ever try to remove the valve springs on your car with a screwdriver? And did the screwdriver slip and let the spring down on your finger? The APCO Valve Spring Remover is without question the best device on the market

for this purpose and it will do anything any Remover will do and a lot easier. It is very simple in construction, made from malleable iron, nickel plated. Can be operated with one hand, leaving the other free to remove pin, and valve can be ground with Remover in position. Don't catch your fingers again.

PRICE - - - \$1.00
POSTPAID

Twenty other Specialties for Ford Cars, carried in stock by most Ford Dealers. :: Free Catalog

AUTO PARTS CO.
Providence, R. I.



DON'T BE FOOLED

ANY LONGER
INSIST
UPON
HAVING
A

VULCUM

THE ONE
SCIENTIFIC
PROCESS

"VULCUM"
VULCANIZES
TUBES OR CASES

Price, Complete Outfit, \$2.00; Enough for 50 Guaranteed Repairs.

For Best attention address

MONEY BACK GUARANTEE

VULCUM MANAGER, Richardson Tire Co., Hartford, Conn.

Enjoy your car—

A pleasant day—an enjoyable ride spoiled by having to get out and sweat and strain with a hand-pump over a flat tire.

Don't do it—Get a

BROWN IMPULSE TIRE PUMP



Attached and detached instantly. Gauge accurately registers air pressure—gives up to 150 lbs. in from one to four minutes.

You don't know how easy it is until you have a BROWN.

Get one today at your dealer's. If he can't supply you, write us.

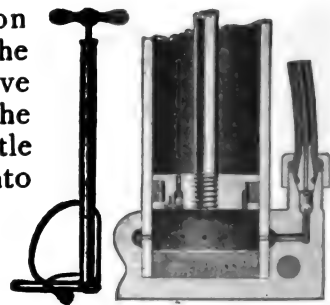
THE BROWN COMPANY

1100 S. CLINTON STREET SYRACUSE, NEW YORK

Pitner Pump

HAS AN AIR TIGHT PISTON

A leather piston ring fits around the plunger in a groove (see cut). Behind the leather ring is a little air space opening into the lower side of the piston. The more pressure you develop the tighter the leather ring presses against the barrel. No air gets past this piston. A new pump or your money back if it fails to work as you think it should.

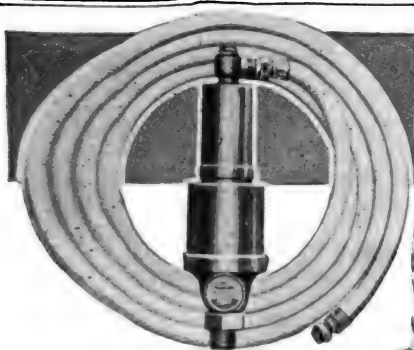


Send us \$5 for a Pitner, shipped express prepaid. Or see your dealer. *Guaranteed* for 5 years' service.

PITNER PUMP CO. 1214 S. Michigan Ave., Chicago

FRED'K H. BEACH, Eastern Representative,
Hudson Terminal Bld'g, New York

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KEEP COOL!

Don't spoil your motoring pleasure pumping tires by hand.

Save time, temper, and energy by letting your motor pump them for you with a

SPARK PLUG PUMP

Simply substitute it for any spark plug, let your motor run, and in from 3 to 4 minutes it will inflate the largest tire with air taken pure and cool, direct from the atmosphere. No deteriorating gases are drawn from the cylinder.

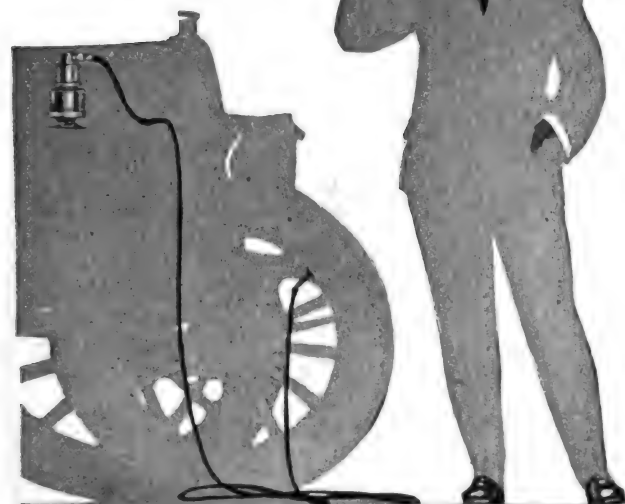
Simple, isn't it? Doesn't it beat wrestling with a hand pump on hot and dusty days?

The SPARK PLUG PUMP complete weighs but 2½ pounds. It is so compact that you can take it with you anywhere in the tool box. It is made with metal rings like your motor—and will last as long. Because it comprises no complications it offers every motorist a lifetime of trouble-proof pump service. An occasional oiling is the only attention it ever demands.

Adaptable to all sizes of cars, from the smallest FORD to the largest LOZIER.

COMPLETE WITH 12 FEET OF HOSE AND CONNECTIONS **Price \$10.00**

MAYO MANUFACTURING CO., 59 E. Eighteenth St., Chicago



Model-1912 Protector

is constructed for **STRENGTH**—built for **DURABILITY**. Has been run 12,000 miles with *absolute* satisfaction.

SAVE HALF YOUR TIRE BILLS. GUARANTEE YOURSELF AGAINST PUNCTURES, RIM-CUTS, BLOW-OUTS and SKIDDING.

20th Century Model Protector

does just what you expect it to do—affording *perfect, positive* tire protection under *any and all* conditions. Prolongs the life of any tire and greatly increases the mileage. Makes old, worn or damaged tires do *double* duty.

Our BROAD-GAUGE GUARANTEE is back of every sale. Goods shipped on approval, with privilege of examination, without payment of one cent.

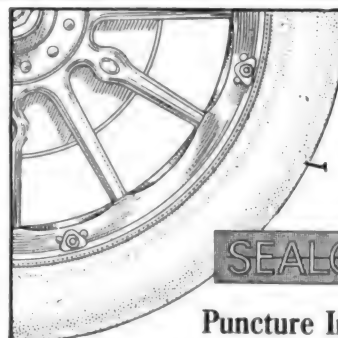
Write for **BOOKLET** and full information.

SPECIAL OFFER to make in UNASSIGNED territory.

20th CENTURY TIRE PROTECTOR CO.

Main Office and factory, MIDLOTHIAN, TEXAS

DALLAS OFFICE, Pacific and Olive Streets, DALLAS, TEXAS



PICK UP A NAIL?

Just pull it out and ride ahead, if your tires have

SEALO TREATMENT

Puncture Insurance at 1/3c per Day

Squirt a can of **SEALO** into each tire—you can do it yourself—everybody's doing it—then you can forget all puncture troubles forever. Yes, that's *true*; and, better yet, it's *guaranteed in writing* with a

MONEY-BACK GUARANTEE

A written contract is given with every **SEALO** treatment that your puncture troubles and expense are over, or your money back any time within a year! **SEALO** is guaranteed to give *perfect service* and will perform its full functions as long as the tube lasts! **SEALO** is beneficial to rubber—keeps your tube "alive."

Send Now for SEALO Tire Book—IT'S FREE!

Tells all about how *you* can get your full money's worth out of your tires—no matter what make. The information in this book is worth many dollars to you. Tells how **SEALO** works, what it is. Contains copy of our Money-Back Guarantee.

Splendid Proposition for Dealers!

Sealo Tire Company

1409 Michigan Avenue

Dept. J20

CHICAGO, ILL.

NAME

ADDRESS

Please send FREE with-out obligation your SEALO TIRE BOOK.

SEALO TIRE COMPANY, CHICAGO
Dept. J20 1409 Michigan Avenue

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The Atwater Kent Ignition System

ANY CAR equipped with a self-starter requires an ignition system capable of producing a hot starting spark with the engine at a standstill.

Instead of a thin stream of weak sparks, the starting button of the Atwater Kent System produces a single heavy flame-like spark from three to five times hotter than the normal running spark. It will ignite any mixture that will burn.

This is but one of many excellent features of an ignition system that combines all of the advantages of both magneto and battery ignition—a simple device with but three moving parts, one contact, one adjustment—one non-vibrating coil—a system ideal in its efficiency, simplicity and reliability.

Write today for illustrated booklet "G"
full of interesting ignition information

Atwater Kent Mfg. Works,
Sixth and Market Streets, Philadelphia, Pa.



Guide

Electric Headlights Stand the Service

The reflectors hold their power, all electric fittings are strong and of ample capacity—parts do not work loose and rattle.

Send for Guide Books No. 1 and No. 2.

THE GUIDE MOTOR LAMP MFG. CO.
2069 East 4th Street CLEVELAND, OHIO

Packard CABLE

IS THE PUBLIC'S CHOICE FOR
Lasting Ignition and Lighting Service

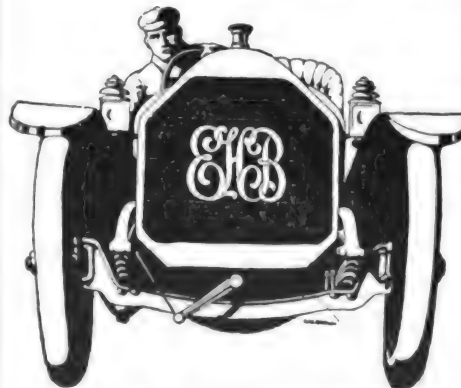
Why? "Ask any user."

Want new 2-color circular?

THE PACKARD ELECTRIC COMPANY

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Monograms



Your's is not a public car.

Get out of the crowd.

Put your monogram on your car. It is the finishing touch of refinement and it will make your car distinctive.

**Monograms
from \$2 up**

The best at the price of the cheapest.

Send for Catalogue E

**THE HICKOK
MFG. CO.**

44 St. Paul Street
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"EXO"

THE LOW PRICED HORN WITH
THE HIGH PRICED VOICE

Note the Price:

ALL SIZES FOR CARS OVER 30 HORSE-POWER, - - - \$7.00

ALL SIZES FOR CARS 30 HORSE-POWER AND UNDER, - - - \$5.00

Attach it yourself in 15 minutes. Operates from the Exhaust.

Satisfaction Guaranteed or Money Back.

Ask your dealer, or order direct.

Give make, year and model of car.

TROY AUTO SPECIALTY CO., Troy, N. Y.

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The Reason Why These Tires

Run 10,000 Miles Without a Blow-out



is because Interlock Inner Tires were put in them when the tires were new. Interlocks provided the necessary extra strength to prevent any overstrain in the fabric and kept it from breaking and developing blow-outs. These tires were actually run over 10,000 miles—all the rubber worn from the tread and two places worn through every ply of the tire to the Interlock without a single blow-out. These Interlocks are now in use in a new set of casings and will repeat the service. There was no chafing, heating or injury to the tubes. Interlocks preserve the fabric and

prevent breaks from starting (the immediate cause of blow-outs). They double the strength of your tires and make blow-outs impossible unless a tire is already broken. In case of breaks already started have them fixed, put Interlocks in and get double mileage and genuine tire satisfaction.

Don't put Interlocks in tires that look like those in the picture and expect long mileage or satisfactory service. Put them in new tires or tires in which the fabric is still sound and run them until they *are* like the illustration.

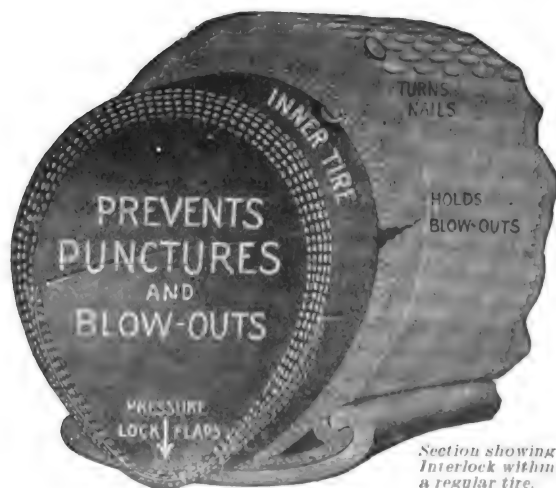
Interlocks are made endless, fit perfectly—easily installed by anybody. Have their own integral flaps, thus preventing tube pinches and affording the same strength to the side as well as the tread of the tire.

Even if Interlocks did not add one single extra mile to your tires they would be worth twice their cost in increased comfort, and that feeling of perfect confidence in freedom from blow-outs and punctures. Don't spoil the pleasure of motoring another day but write us for catalog and prices. Equip all of your tires with Interlocks and you can enjoy the full pleasure of driving your car the rest of the season without fear or thought of trouble.

Owners: Don't accept anything "just as good." The Interlock Inner Tire is the only reinforcement having its own flaps, and fully protects the rim and side of the tire. Get the Interlock features and the Interlock quality. If your local dealer cannot supply you write direct for prices and full particulars. A postal will do.

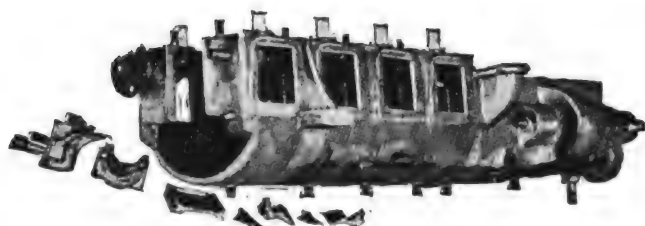
Agents: Sell direct to owners and establish a good profitable business in your territory.

Dealers: Send now for this trade winner. Owners will buy when they see the Interlock Inner Tire. One dealer sold 250 Interlocks in May; many others doing equally well. A big profitable business awaits you if you act quickly before your territory is taken.

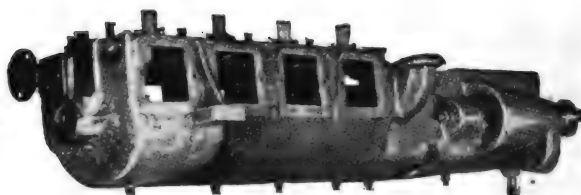


DOUBLE FABRIC TIRE CO., 18 West 9th Street
AUBURN, INDIANA

Please mention the Automobile Dealer and Repairer when writing to advertisers.



Aluminum crank and gear case, complete, worth \$96, with end bearing and part of end broken out.



Same crank and gear case with end bearing welded with Prest-O-Welder. Complete cost of repair only \$7.75.

Prest-O-Welder

Will Pay Big Profits to Garages, Manufacturers, Machine Shops

The pictures above tell the story. \$96 worth of material saved for \$7.75.
The profits from this piece of equipment will pay you back its cost and big profits in a short time.

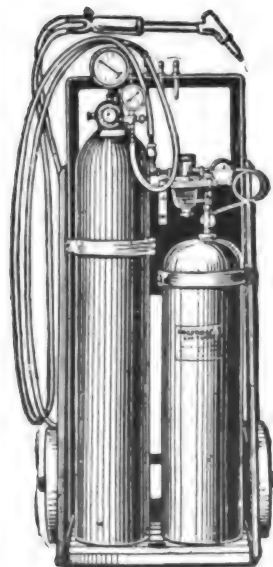
The Prest-O-Welder is always ready for instant use—needs no attention beyond opening two valves when you are ready to use it.

It welds brass, bronze, aluminum, steel and cast iron with a strong, seamless surface.

It is mounted on a compact, two-wheel truck and can be used in any part of the shop.

By its use thousands of men are going to build up big paying businesses. Millions of dollars worth of parts are thrown away that can be made good as new by welding.

Don't let the opportunity go by. Figure the profits that this proposition means. Learn how we help you to build up business with the Prest-O-Welder.



Learn how automobile parts costing \$326.00 to replace, can be welded for \$11.75. We stand ready to prove these facts to your satisfaction.

Send to-day for the Prest-O-Welder literature giving full information, explaining the operation and construction, and showing how the most difficult welding jobs are done.

The Prest-O-Lite Company

Welding Dept., 251 W. South Street

Indianapolis, Indiana

Please mention the Automobile Dealer and Repairer when writing to advertisers.

That Tire Question

Would soon cease to be so annoying, once you make yourself acquainted with the **Triple Tread** method of eliminating your punctures, preventing your car from skidding, and doubling your tire mileage.



"BEFORE"

The strength and resilience of a tire is in its heavy fabric carcass. Rubber treads are only to furnish a wearing surface to protect this carcass, and to keep out its greatest enemy—water.

Chrome leather, reinforced by steel studs, is the only thing tough enough, water proof and pliable enough to make a better and more economical tire tread than rubber. Chrome leather is ten times tougher than rubber, and water proof.

Three plies of this leather, brought down over the bead of the case so as to prevent rim cutting, and to protect against rut wear—three to six rows of hardened steel studs to give traction and prevent skidding—all this securely **vulcanized** to your casing (old or new) to keep out water and dirt—goes to make up the highest grade of tire efficiency.

The secret of Triple Tread Success lies in the fact that the Triple Tread affords perfect protection to the fabric carcass and positively keeps out all water, which causes rotting. Rubber treads cannot do this—detachable rubber or leather treads cannot do it—inside linings cannot do it. **Nothing but chrome leather, vulcanized to your tires in the Triple Tread way, can do it.**

PUNCTURE PROOF

SKID PROOF

GUARANTEED

Let us Triple Tread just one of your tires now for a trial. The best time to act is while your car is laid up for the winter. Don't wait till you are ready to take the car out in the Spring.

**Write our nearest factory for full particulars and prices.
EVERY TRIPLE TREAD GUARANTEED FOR 3500 MILES.**

Name

Address

Make of car..... Size of tires.....



"AFTER"

Triple Tread Manufacturing Co.

CHICAGO
1542 Michigan Avenue

SAN FRANCISCO
542 Van Ness Avenue

WINNIPEG
52 Gertle Street

Please mention the Automobile Dealer and Repairer when writing to advertisers.

Send \$4.60 for these 5 money savers, shipped anywhere, prepaid. Money back on request.



This TIRE-DOH Outfit will save $\frac{9}{10}$ of your tire repair expense. Price \$2.

We guarantee your satisfaction with *genuine* Tire-Doh by refunding your money any time you ask it. We *guarantee* that with a Tire-Doh Outfit you can *permanently* repair *every* injury that can happen to a *tube or casing* absolutely without vulcanizing and at 1-10 its cost. You can repair punctures, blowouts, cuts—in both tube and casing—15 minutes for a puncture, an hour for a blow-out. Don't confuse this *genuine* Tire-Doh Outfit with the many *worthless imitations*, packed like our outfit and offered by *unscrupulous* dealers trading on our reputation. There is only one Tire-Doh Outfit. It comes in a white enameled can (like cut). The name is our registered trade-mark. Get the genuine guaranteed article direct from us, if your dealer won't supply you. If desired, shipped separately upon receipt of \$2.

PRESERV-O Tire Paint keeps tire surface waterproof and increases mileage.

Examine your tires carefully and notice the thousands of little breaks. These are the beginning of decay. You can fill them and cover them with Preservo-O Tire Paint. It is practically all pure rubber. It cannot hurt the tire. It makes the tires white and improves the appearance of your car. Shipped separately, if desired, upon receipt of price, 50 cents. Enough for six big tires.



One shine a month keeps your lamps bright and clean if you use the STA-BRITE Outfit.

One hour's work a month will keep all the metal parts of your car clean and bright. This Sta-Brite Outfit is the only article of its kind on the market. Consists of a polishing cloth (better in itself than any metal polish), a can of Sta-Brite and a brush. After polishing with the cloth, apply Sta-Brite and the polish will remain untarnished 30 to 60 days in any weather. Price of outfit \$1, shipped separately if desired. Money back, of course.

DESTROY-O Carbon Remover

Saves all the expense and delay of having cylinders cleaned at the garage. This liquid will remove all the carbon from a cylinder in one night. Nothing to do but pour it in. Price \$1 for 1½ quarts, shipped separately if desired.

PREVENT-O Tire Friction

Internal friction harms tires by overheating them. Prevent-O Tire Friction is a fine talc powder that you shake into the casing when inserting a tube. ½ lb. costs 10 cents and will do much to prolong the life of your tires. *Not shipped separately.*

You can reduce the expense of running your car by using every one of these articles. You can secure doubled tire mileage, save a lot of work and money polishing bright work, and get more out of a gallon of oil and gasoline. Send us your check now and get all 5 money savers, express prepaid. Remember, money back if you ask it.

ATLAS AUTO SUPPLY CO. 77 East Adams Street, Chicago, Ill.

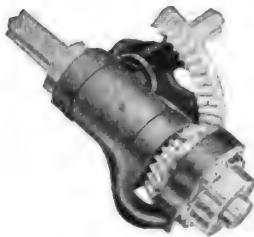
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A Perfect Starter At Last! Energetic Dealers Wanted

A rare business opportunity. Live dealers throughout the entire world wanted to represent us and to install the National Starter

The First Perfect Mechanical Starter

It has always been said that if a *perfect* starter could be built—a *dependable* starter—one that would start the engine from the seat and forever do away with dangerous cranking—that such a starter would revolutionize motoring—that it would add the final touch of perfection to the automobile.



—and now, after years of experimenting, comes the first *perfect* mechanical engine starter—the NATIONAL STARTER—the only starter that is actually 100% efficient.

Works every time.

No batteries—no tanks—no wiring—no piping—no springs. Nothing but simple ball-bearing gearing.

Dealers in automobiles and accessories, and garage owners will instantly recognize the tremendous business possibilities of this new starter.

The Principle of the National

The National is built on a patented principle. It is purely mechanical.

A simple pressure of the foot and the engine turns over—just like cranking.

The powerful leverage which is obtained through gear reduction turns the engine over easily—*so easily that you can start on the magneto just as readily as on the batteries.*

The National works equally well in hot or cold weather. It is *not* dependent upon acetylene gas, compressed air, gasoline, electricity or springs. It develops its entire energy through the slight pressure of your foot on the dash pedal—like a clutch. In case of back-fire the National automatically disengages.

We have subjected the National to the severest tests. We have tried it out in all sorts of weather and on all sorts of cars. We made it *prove* its merits.

And now we back every National with an ironclad guarantee for one year.

Easy to Install—Easy to Operate

The National can be installed on any car in about two hours' time. It is fastened to the front of the car in place of the crank. Total weight is about 15 pounds.

THE NATIONAL GAS ENGINE STARTER COMPANY
Dept. 554 B, 30-32 N. Dearborn St., CHICAGO, U. S. A.

Car Owners: Write us for literature and name of nearest "National" dealer.

Manufacturers: Write us for literature and our offer to install the National as standard equipment.

A ten year old child can operate the National easily. One pressure of the foot—the crank shaft turns—the engine starts. Just a simple mechanical operation.

A Big Business Proposition

The tremendous demand for a *perfect* starter makes the selling end of the National only a matter of proving its merits. *Thousands and Thousands* of car owners will install the National as soon as they see it.

They'll want the advantages of the National for themselves as well as to enable the women-folks to drive. You see the field is practically boundless.

Big business men consider this a big enough proposition to open up special demonstrating salesrooms for the exclusive sale of the National.

They realize the wonderful possibilities of the National.

The retail price of the National is \$50.00 *completely installed*. Figure out approximately the number of cars in your territory and you will have an idea as to how broad a proposition this is.

Applications for Agencies Now Being Received

Already we have received thousands of applications for National agencies. We are literally *swamped* with requests. South America, England, Germany, France—energetic

dealers in all these countries have applied for National agencies as well as thousands of American business men. But we are prepared to meet the tremendous demand.

We have practically unlimited manufacturing and financial resources.

Agencies for the National Starter are now being allotted. Applications will be handled in the order in which they are received.

Wire us, and come to Chicago if you can—let us show you just how the National is built—let us tell you in a personal interview the tremendous business possibilities of this proposition.

If you cannot come, write us. Full information and large descriptive circular can be had by signing and mailing the coupon.

Coupon for Free information

The National Gas Engine Starter Co.,
Dept. 554 B, 30-32 N. Dearborn St., Chicago.

Gentlemen:

Please send me full particulars regarding a National Agency.

Name.....

Address.....

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A Jury of
Eminent Users
Enter the
Following
Verdict!



On the Twin City to Helena Tour.

"BRICTSON" Detachable Tire Treads

Here's
Bricton

Here's
the Jury
You Be the Judge!

Bricton Treads are worth looking into. You will find them a vital source of tire economy. In our literature are put before you some FACTS that we haven't the space for here—learn more about Bricton Detachable Treads and start saving \$3.00 out of every \$4.00 you are now spending for tire expense.

are satisfactory—they save \$3 out of every \$4 spent on tires—they uphold every claim made by the makers.

Now We Want You
To Be Your Own
JUDGE

in his 66-H P. 7-passenger Pierce-Arrow (fully equipped with the famous Heavy Car Type "BRICTSON DETACHABLE TREADS"), which was the Official Press Car in the Twin City-Helena Auto Tour that took place July 20-28, 1911. FACTS ARE as follows: There were 22 cars in this tour on which there were replaced 200 new tubes and 90 new casings, making an average tire expense of \$256 on each car as against not one cent for tire expense on the only car equipped with the BRICTSON treads. (As Press Car, the Pierce-Arrow, equipped with BRICTSON treads, carried the greatest proportionate weight.) Do you want results? Then buy Bricton treads! Surely this is a record of results demonstrating a positive tire saving that one can't pass up without second thought.



In the Little Glidden Tour, from Minneapolis to Fargo and back—a distance, as traveled, of 565 miles—the Chalmers Roadster equipped with BRICTSON treads, was the only car to go through the entire trip without tire troubles or expense. 27 cars were entered for this tour. More "proof."

Better Get Information
on the "Bricton" today.

You insure your life while you are insurable. Then why not insure your tires while they are insurable? Remember the BRICTSON treads are to protect tires—not to "rejuvenate" the ! So, while your tires are good keep them good.

\$4—\$3—\$1

Primary class? No, just a problem that looks good to all motorists who adopt "BRICTSON" treads.

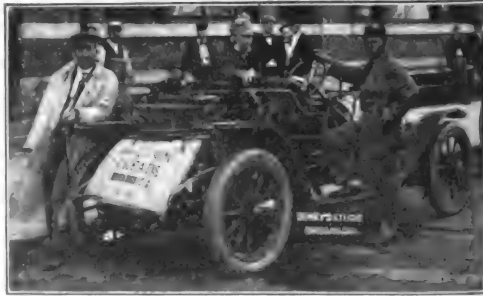
Where an owner usually spends \$4—with "Bricton's" he now spends \$1, that's all! A pure and simple saving of \$3 out of \$4.

Want us to give you a concrete example of the exact saving mentioned above? Then sign and send the Motorist's Coupon to-day. This will put money in your pocket.

So get the coupon back to us, quick—we'll put additional "evidence" in your hands and let you act as your own judge. And you, Mr. Dealer, will want information about the "Bricton" Why? Because the owner will demand them and you can't afford to "block" such a profitable game, can you? Let us give you details by return mail.



On the Big Glidden Tour, New York to Jacksonville.



On the Little Glidden Tour, Minneapolis to Fargo.

DEALER'S COUPON.

O. A. Bricton, President, The Bricton Mfg. Co.,
172 Bricton Bldg., Brookings, S. D.

Without obligation on my part send me your Exclusive
Agency Proposition, 1912 Catalogue and Dealer's Folder.

Name.....

City.....State.....

County.....

O. A. BRICTSON, Pres.

The
Bricton Mfg. Co.
Brookings, S. D.
U. S. A.

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O. A. Bricton, President, The Bricton Mfg. Co.,
172 Bricton Bldg., Brookings, S. D.

I am interested and would like to know more about "Bricton" Detachable Treads. Send me your booklet, "The Enemy of Tire Expense," Proofs from Automobile Owners, Prices, etc.

Size of Tire.....

Name.....

Address.....

Dealer's Name.....

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FREE to Tire Repairmen

This only complete text book is yours for the asking.
Invaluable to any man who does repairing. Write for it **now**.

Also get our Proposition on

"Firestone" REPAIR STOCKS

LIGHT WEIGHT

HIGH QUALITY

We make Firestone Repair Stocks light in weight so that they go farthest in making tire repairs, giving you a clear saving in dollars and cents on every job.

We make them of Firestone quality so that they will go farthest in making satisfied customers, for the reputation of Firestone tires is back of Firestone Repair Stocks.

Firestone Accessories:

Complete Repair Kits	Lace-on Boots
Cementless Patches	Repair Materials in air-tight Packages
"Curecut" Gum	Talc or Soapstone
Acid-Patching Outfits	Tire Tape Pump
Pure Gum Patches	Air Pressure Gauges
Blowout Patches	Valves and Valve Parts
Emergency Patches	

Satisfied Customers always come back—Firestone goods make satisfied customers.

Write for the book and latest proposition at once.

The Firestone Tire & Rubber Co.

"America's Largest Exclusive Tire Makers"

AKRON, OHIO

MAIL THIS COUPON TODAY

THE FIRESTONE TIRE & RUBBER CO.,
Akron, Ohio.

Dear Sirs:—Please send me your free book on repairing, also your proposition on Repair Stocks. Herewith my letterhead.

COMPLETE VULCANIZING PLANT \$45

This vulcanizer has revolutionized the tire repair business. It does all the work of the old style vulcanizers costing four times as much and is so simple that any boy who can wash a car can operate it.

Tube plate is 30x4 inches. Repairs six tubes as quickly as one. Can be heated independently of the casing attachment.

The double casing attachment repairs casing blow-outs by the well-known wrapped tread method originated by Mr. Shaler. Heat is applied simultaneously to inside and outside of a casing. This method makes a guaranteed repair at less than one-half the cost of the old sectional method.

Also repairs sand pockets and casing cuts with tire on wheel.

Steam is generated in 20 minutes in the copper coil boiler. A gallon of gasoline runs the whole outfit more than a day.

It's a
SHALER

and has the exclusive Shaler feature of a temperature control that is automatic. Simply start the burner and let the vulcanizer take care of itself. A thermostat regulates the flame and keeps the steam pressure just right for vulcanizing. As a check on this mechanism there is a safety valve set to relieve the pressure should it accidentally run above the vulcanizing point.

Write today for full description

Ask for our N. P. R. circular. It tells in detail all about the work you can do with this big machine.

We can guarantee prompt delivery of orders received prior to August 15th.

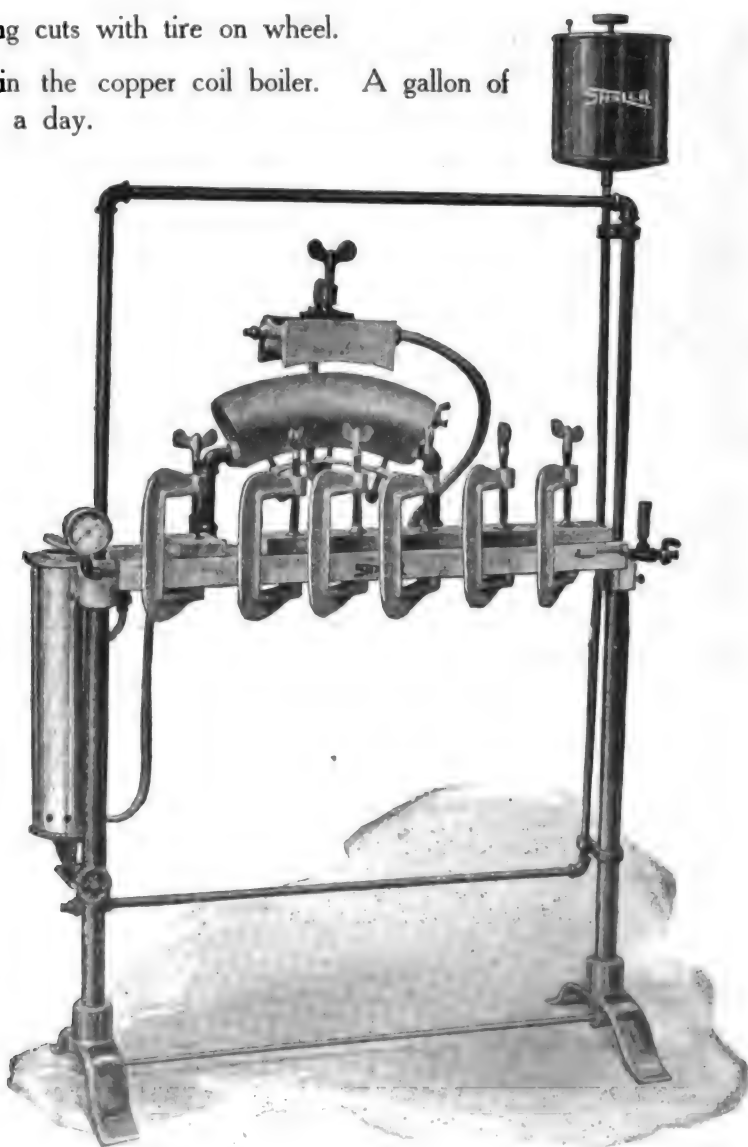
Type N. P. R. Complete Casing and Tube Vulcanizer. List, \$60.00

To the Trade, - - - - - 45.00

Type N. Multiple Tube Vulcanizer. List, - - - - - 35.00

To the Trade, - - - - - 26.25

(Both are complete with boiler, generator and all attachments.)



C. A. SHALER CO., 806 SIXTH STREET, WAUPUN, WIS.

Manufacturers of the only complete line of vulcanizers in the world.

If you could see your differential work you'd be mighty careful of its lubrication

If we could see the actual workings of the human heart, we would swear off smoking and cut out heart-weakening habits.

Not seeing, we make mistakes. But nature, the great compensator and adjuster, counteracts our blunders.

If you could see the actual service working of the differential of your car, you'd be filled with wonder and alarm.

You'd never neglect its lubrication, or consciously use a poor lubricant.

Nature doesn't help a differential; it harms it in the guise of Friction.

Carelessly speaking, a differential is a conglomeration of cogs.

Carelessly considering, any oil or grease is a safe lubricant for a lot of cogs.

But accurately speaking, a differential represents the highest form of gear assembly with bevels, spurs and pinions, running on ball and roller bearings.

Its duty is severe—speed, load, direction, everything variable.

Each side of every tooth gets wear; the load is thrown on instantly, nine times out of ten from a standstill.

Perfect lubrication at any price is no extravagance in a differential.

It is a real economy to use the best lubricant you can buy.

Every tooth must be coated heavily with good bodied lubricant, not merely wet with oil or filmed with grease.

Keeping the teeth enveloped is only one duty of the lubricant; immersing the ball and roller bearings is another; remaining within the differential housing is another. The lubricant must not escape.

If your gears show wear or make noise, or if your lubricant melts and leaks out, you had better alarm yourself into a trial of

All leading dealers handle Non-Fluid Oil. Ask your dealer, but insist upon the genuine.



In purchasing Non-Fluid Oil be sure the can is orange colored and bears this trade mark.

We are not talking of an expensive innovation. The actual yearly outlay for Non-Fluid Oil is less than for any other lubricant.

Post yourself further on the differential. And then post us a request for a free sample of either grade. Paste the attached coupon on a postal. Mention the grade you desire.

New York & New Jersey Lubricant Co.

165 Broadway, New York

CHICAGO: 1430 Michigan Avenue

PHILADELPHIA: 1416 Vine Street

Pacific Coast Distributors: HUGHSON & MERTON

LOS ANGELES SAN FRANCISCO PORTLAND SEATTLE

Use "K-No. 000" Grade or "K-00 Special" Grade Non-Fluid Oil for your differential.

The K-No. 000 Grade is a fairly heavy bodied lubricant for use in differentials where the housing would allow a lighter lubricant to escape.

The K No. 00 Special is a light bodied product especially designed for fairly oil-tight housings. This will not leak out where ordinary oil would.

When you have put a supply of this lubricant into the housing, you snuff out friction and stifle noise.

The gear teeth pick it up and it clings to them and coats them. The gear mesh is a soft, yielding cushion steel never touches bare steel. The only wear is a slow oily polish—there is no rapid abrasion.

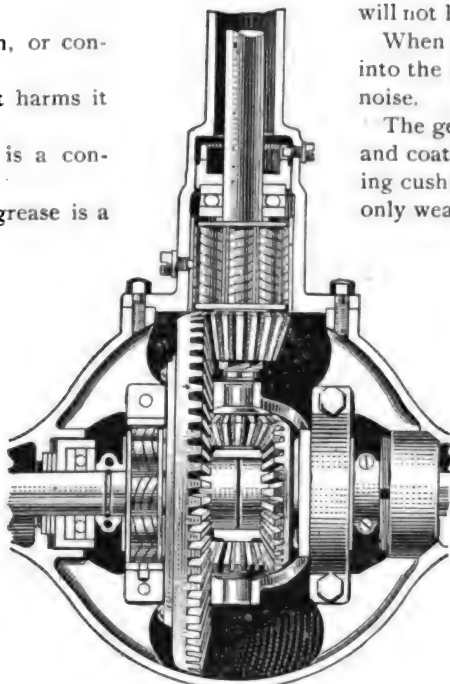
At no time, under hot weather conditions or hard steady drives, does Non-Fluid Oil melt. Nine grease lubricated differentials out of ten, leak, proving the melting of grease. All oil-lubricated differentials leak. Often the lubricant follows the axle and makes its escape through the brake drums.

The brakes slip, wheels are smeared and tires rot.

Non-Fluid Oil means a clean rear axle, and a perfectly lubricated differential. If you will inquire, you will find that worn-out differential gears invariably accompany grease or oil lubrication.

With Non-Fluid Oil the differential outlasts the engine itself. Non-Fluid Oil is amazingly durable. The supply is depleted only by being actually rubbed out of existence by the gears.

The ball and roller bearings are kept bright and never become gum-bound as occurs with rancid grease. Pitting is impossible. Non-Fluid Oil is acidless.



THE DIFFERENTIAL

Please send me free sample of **NON-FLUID OIL**

Grade _____

Name _____

Address _____

Dealer _____

Address _____

Label 20

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**A
Quick
Repair**

Increases Mileage Cuts Tire Cost

It's tire neglect, not tire wear, that's so expensive. Mend the small holes and you'll never have big ones. The very best remedy for tire troubles is the

M. & M. CEMENT-DOH OUTFIT

Cost only \$1.25 complete. Sent prepaid anywhere.

Or your dealer or jobber will supply you.

No skill is needed to use an M. & M. CEMENT-DOH Outfit. With it anyone can repair any cut, any hole, any slit, any puncture, any blowout in any casing or inner tube. The M. & M. Outfit contains everything necessary to repair sand pockets, or to repair casings where the carcass is exposed.

Just follow directions and you can't go wrong.

The M. & M. way of repairing casings and inner tubes is far better, far safer, far quicker and far cheaper than any method of heat vulcanizing.

Send \$1.25 for an Outfit today. If you are not satisfied you can have your dollar and a quarter back.



A postal brings you free our book,

"Money Saving Facts."

The M. & M. MFG. CO.

Akron, Ohio

Makers of the
Celebrated
M. & M.
Cement.

**PRICE-
COMPLETE
\$1.25**

**for
Every
Tire
Tear**

— Something New —

Rex Velvet Nickel Polish

MADE ESPECIALLY FOR

**POLISHING, PROTECTING AND CONSERVING
NICKEL PLATED LAMPS
GERMAN SILVER REFLECTORS**

**AND ALL SILVER AND NICKEL
PLATED ACCESSORIES**

For which articles no other polish is so good

Soft as velvet.—Does not wear away the Nickel or German Silver more than a thousandth of the extent any polish for general use does.

Leaves the plating protected from corrosion

**Fills in a long time unsatisfied demand
Quickly saves its cost**

Retail price 50 cents.

Made by the manufacturers of the
EVER-SATISFYING, PATRONAGE-HOLDING

REX STAPLES

Rex Metal Cream Polish,

Rex Wood Oil and

Rex Leather Dressing

Now selling all over the civilized world

ARMIGER CHEMICAL CO.

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Reliance

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SPARK PLUGS

Sparks
in
Water

Take less battery power than any other plug.
Are absolutely proof against soot in any form.
Dirty motors won't affect them. Patented electrical action destroys soot as fast as deposited.

Carbon does not affect them. No cylinder knock means longer life to your motor.

Gives HOT concentrated spark.
More power—greater fuel economy.

Reliance porcelain stands fifty to ONE HUNDRED per cent. greater voltage than any other.

Reliance plugs are positively and unconditionally guaranteed to satisfy.

Try Reliance plugs. Regular type, \$1.00; Magneto type, \$1.25. Sent prepaid on receipt of price if dealer can't supply.

Write for our great book, "Ignition and Spark Plug Talk"—tells all ignition secrets; makes you master of your ignition system.

Pocket size—convenient to carry. Sent free.

JEFFERY-DEWITT CO.,
53 Butler Ave. DETROIT, MICH.

New York Branch—1789 Broadway.

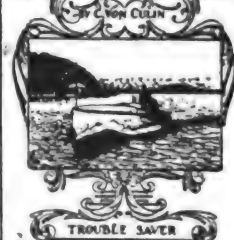


Magneto Type
\$1.25



Regular Type
\$1.00

HOW TO RUN AND INSTALL GASOLINE ENGINES



THIS little book was written especially for beginners. Either the man who uses an engine for pleasure or profit, but who has not time to study a technical book.

It gives full details in connection with running gasoline engines, stated in simple language that anybody can comprehend. It contains numerous illustrations.

A copy will be sent you on receipt of the price, 25 cents, in postage stamps.

Motor Vehicle Publishing Co.,

71-73 Murray Street,
NEW YORK CITY.

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To Save Money—**SAVE TIRES**

And to Save Tires Use

The Auto Steam Vulcanizer

For Casings or Inner Tubes

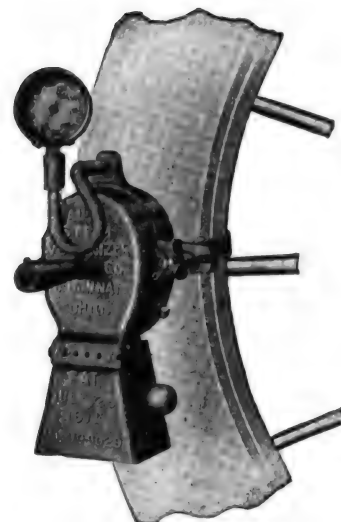
The Auto Steam Vulcanizer, a perfected portable vulcanizer, is a miniature tubular brass boiler, partly filled with water; heated by denatured or wood alcohol. It is operated by an **easily adjusted burner**, which controls the steam at the exact temperature for vulcanizing rubber. It works on the same principle as large steam vulcanizers used in tire factories. The steam does not fluctuate, but maintains a steady, even temperature, perfectly distributed over the whole face of the vulcanizing plate. Steam heat **eliminates the danger of burning the rubber**, which often happens with electric current and directly heated plates. Experts all agree that steam is the ideal agent for vulcanizing rubber.

Steam was never practically available for the individual repair of tires, until the invention of the Auto Steam Vulcanizer.

Its operation is simple. Careful reading of instructions will enable anybody to operate the vulcanizer to satisfaction.

The device is **absolutely safe**. The tiny boilers used are of best metal, and have been tested as high as 500 pounds pressure. This shows their extraordinary strength. Each boiler is tested before shipment. Only 50 to 60 pounds is used for vulcanizing.

It can be used anywhere—at home, in the garage, while on tour. Nothing intricate or delicate about it. **No thermometer to break.**



Vulcanizing a Casing.

COMPLETE OUTFIT, \$12.00

Satisfaction Guaranteed.

Let us tell you Why our vulcanizer is the best.

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Dealers & Jobbers! Write for our latest low prices on

F O R D

Lighting Outfits,
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THE R. C. HULL ELECTRIC CO.

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PERFECTION SPRING WINDER



WILL EARN ITS COST IN ONE DAY'S USE

Adopted by leading manufacturers and machinists as standard for precision winding of extension, compression and torsion springs. Also adapted to wind taper, double taper and left-hand springs. Makes springs any length, diameter and pitch from any gauge wire. No wire wasted. Winds to last inch of stock.

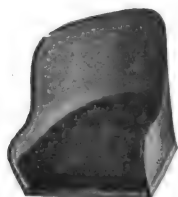
TWO SIZES } Capacity of small size up to 3/32 inch wire. Price \$1.00
 } Capacity of large size up to 3/16 inch wire. Price 1.50
 Special size up to 5/16 inch wire. Price \$3.00

EDGAR T. WARD & SONS, 25 PURCHASE STREET, BOSTON, MASS.

No. 1.

OXYGEN-
ACETYLENE
WELDING A
SPECIALTY

RADIATORS
REPAIRED
BY EXPERTS

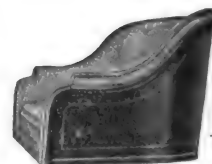
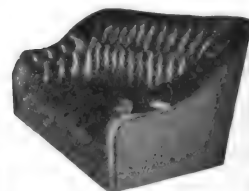


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WIND SHIELDS
LAMPS TANKS
HOODS RADIATORS
AMMETERS
SPARK PLUGS
VULCANIZING
OUTFITS**

SEATS AND BODIES FOR ANY CAR

Special seats for the Maxwell, Buick, Reo, Ford, Brush, Hudson, Mitchell, or any car. Special Bodies made to your drawing. When writing, please give model and name of your car.

SEATS, \$10.00 to \$45.00
FENDERS, \$10.00 to \$30.00



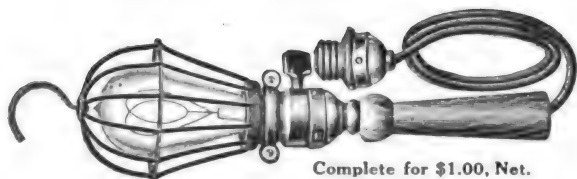
**Fore Doors
For Any Car**

THE METAL BODY TANK & FENDER CO.

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LET THE EVERSAFE PORTABLE LAMP GUARD PROTECT YOU



Complete for \$1.00, Net.

It's dangerous using candles, matches or unprotected incandescent lamps around autos or garages with oils and combustibles near at hand. You need THE EVERSAFE many times daily—you can use it under cars or anywhere with safety. A rattling good seller: a big value. Complete with 10 ft. cord and plug ready for use.

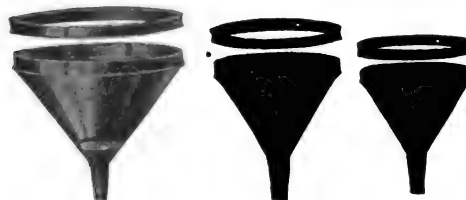
Write for Liberal Discounts to Dealers and Garages with catalog of full line.

McGILL MFG. CO., 88 Oak St., Valparaiso, Ind.

DOVER AUTO FUNNELS

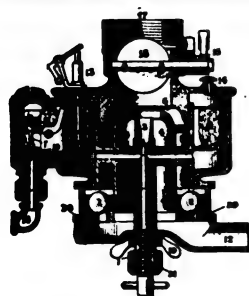
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56 Sizes and Styles



SEND FOR 1912 CATALOGUE.

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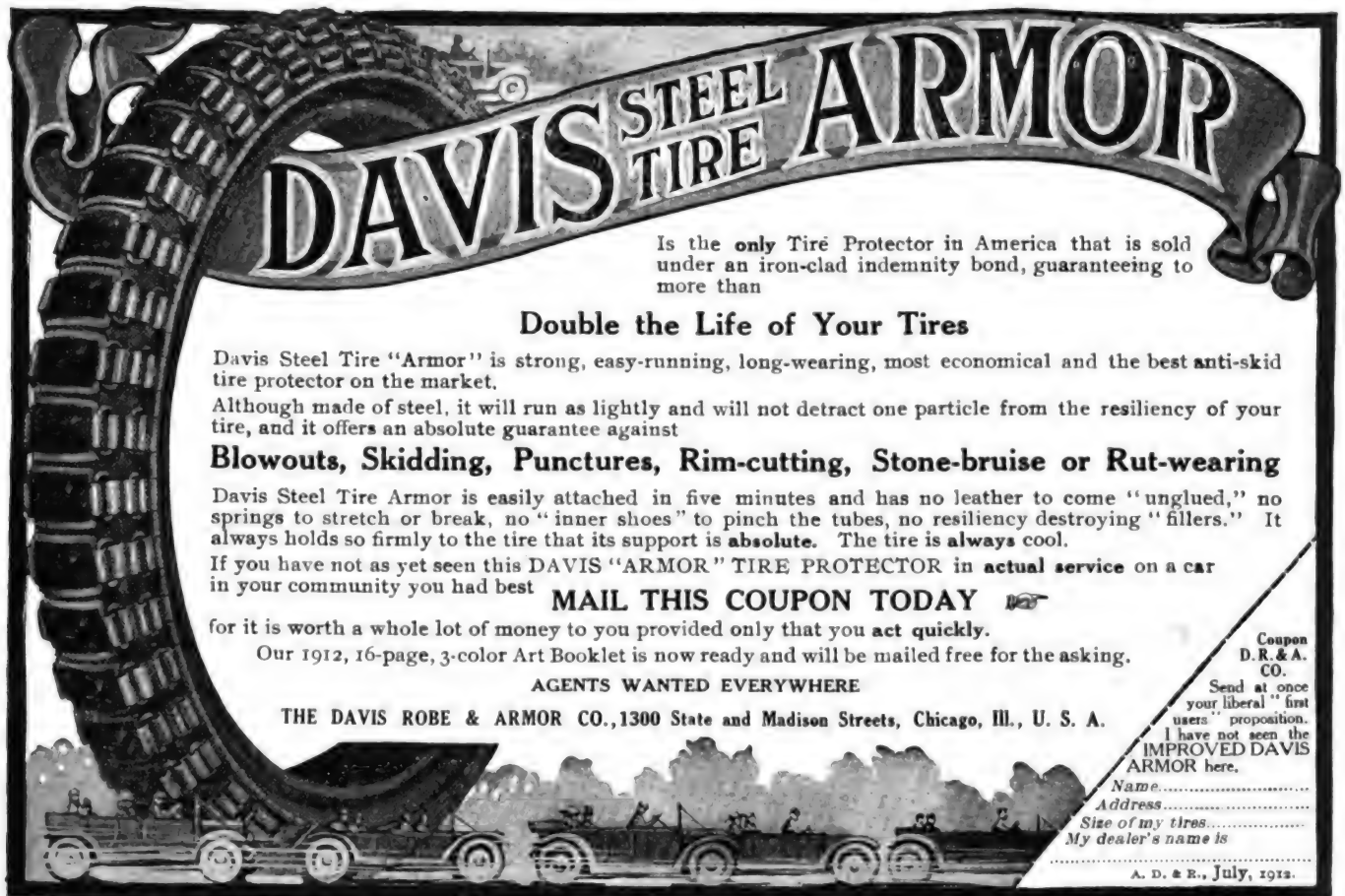
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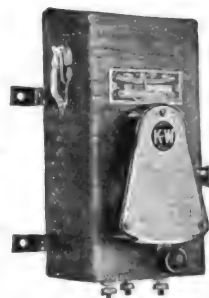
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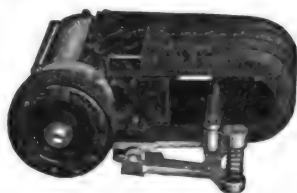
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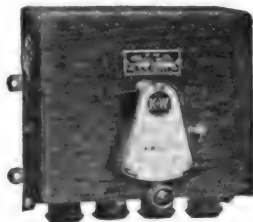
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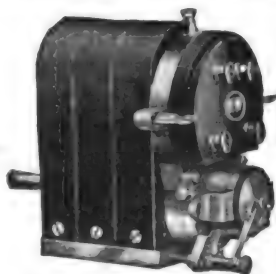
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Guaranteed
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Engines up
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Extremely simple. Perfectly reliable.

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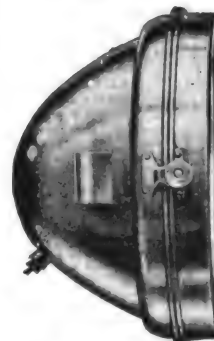
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Choice of Either Straight Body or Bullet Shaped Lamps.

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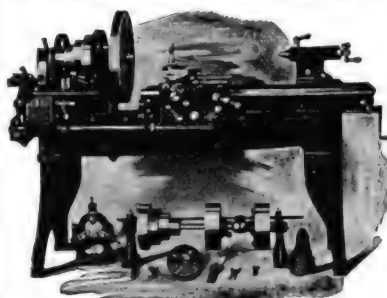


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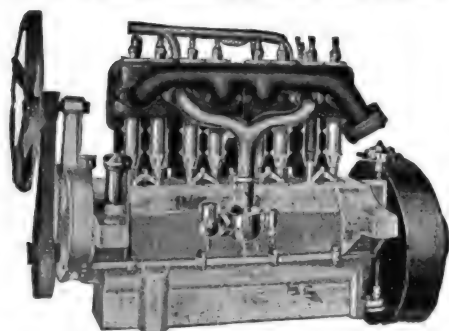
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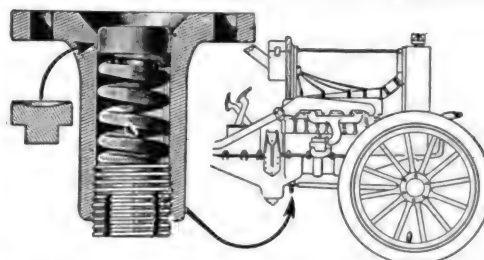


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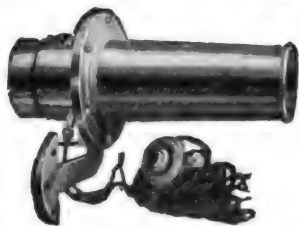
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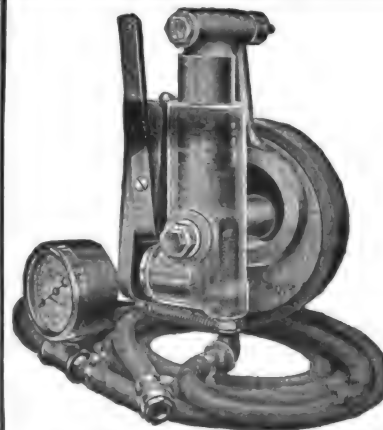
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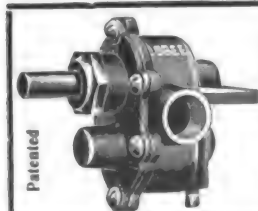
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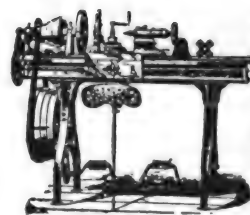
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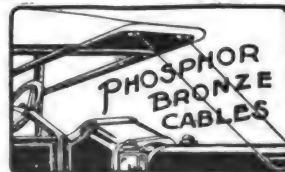
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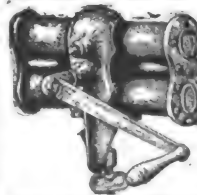
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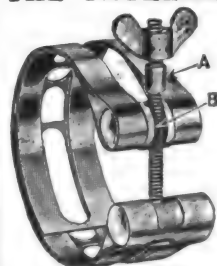


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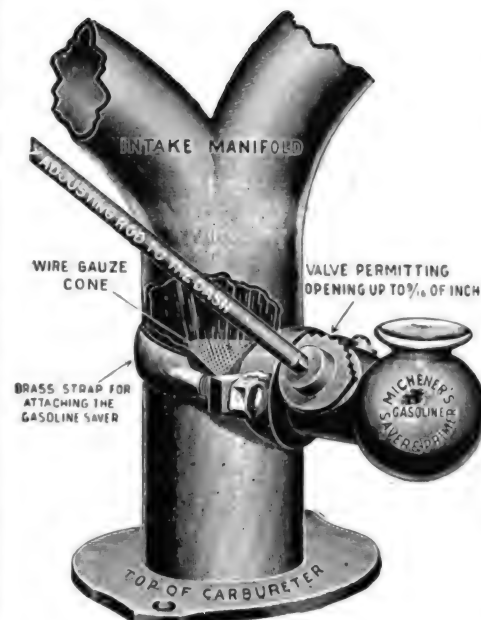
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Steam & Gasoline Engine Dealers.

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Mgr. Loose-Wiles Biscuit Co.

COLE 40

Buffalo, N. Y., June 13, 1912.
E. S. Michener.

Dear Sir:—I have increased the mileage of my Cole 40 from 10 to 12 miles per gallon to 15 to 17 miles per gallon, and feel very much satisfied with the results.

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Niagara, Lockport & Ontario
Power Co.

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E. S. Michener.

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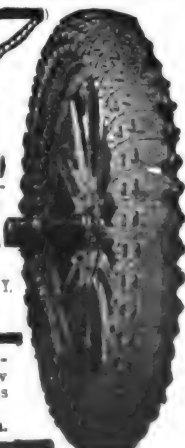
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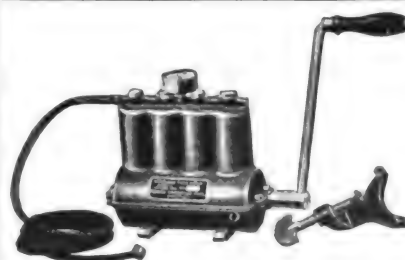
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TABLE OF CONTENTS

	PAGE		PAGE		PAGE
Trouble in One Cylinder	33	Needs a Different Carburetor	46	Simple Remedies Usually the Last to be	
Tuning Up the Engine	35	Magneto Trouble	46	Tried	51
General Repairs	36	Misses and Heats	47	To Prevent Overheating	51
The Weather and Lubrication	37	He Has a Knock	47	The Loose Steering Post	52
Automobile Exports	37	After Six Years	47	How He Destroyed the Rattle	52
Clearing Cylinders of Burnt Gases	38	A Peculiar Knock	47	His Remedy for the Rattle	52
For Use on a Down Grade	38	Hard Starting	47	The New Hudson	52
Bore and Stroke	39	Possibly a Weak Mixture	48	An Important Event	54
Gasoline and Carbon	42	For E. M. F. Owners	48	Automobile Collisions	54
Life of an Automobile	42	What Causes the Buick to Miss	48	Life of an Automobile	54
Splash Guards	42	For Loosening Carbon Deposits	49	"Mania" the Correct Word	55
A Lock Nut	43	Who Can Tell Him?	49	Nothing To Do With the Case	55
Gasoline Fires	43	The Cooling System	49	The Whole Road	55
A Clicking Noise	43	Needs Overhauling	49	Lessons for Drivers	56
Trouble of a 1907 Model	43	Rattling in the Steering Gear	49	What Becomes of the Old Automobiles	57
The Engine Skips	44	That Rattling Noise	49	Lubrication Problems	57
The Mixture and the Gasoline	44	For That Rattling Sound	49	A Cleaning Brush	60
Loose Gearing	44	That Elusive Rattle	49	Automobile Painting	60
It Loses Power	44	Tire Stress and Life	50	The \$5,000 Lozier	61
Carburetor Trouble	45	For E. M. F. Car Owners	50	Sheet Metal for Limousine Back Pan-	
Several Queries	45	The Two-Cylinder Reo	50	els	61
Needs Thicker Oil	45	Ford Coil and Binding Post Wire	50	Noise in Motor Cars	62
Lost Motion	46	Cause of a Starting Trouble	50	Four Speeds	63
The International Car	46	Foul Air in the Crank Case	50	Steam Car Department	65
		Heat is Heat	51	Address Wanted	65

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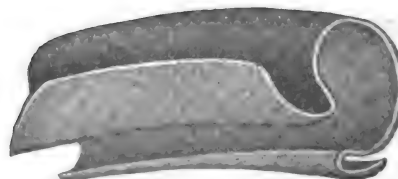
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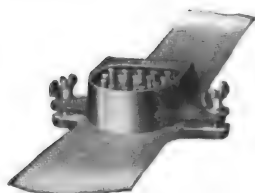
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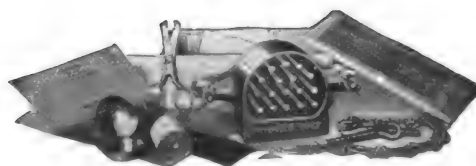
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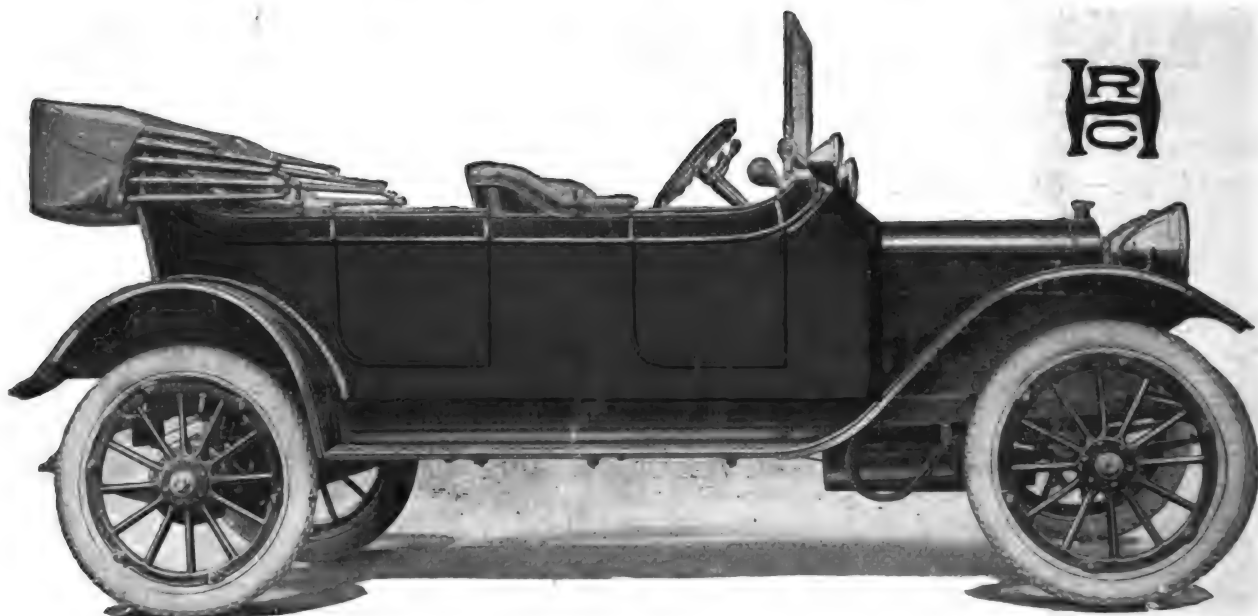
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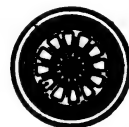
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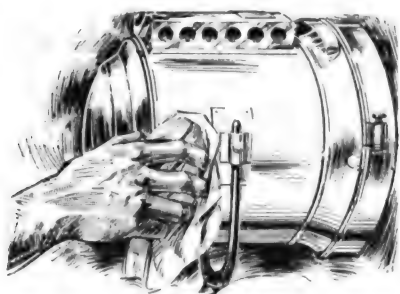
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Vol. 13, No. 6.

NEW YORK, AUGUST, 1912.

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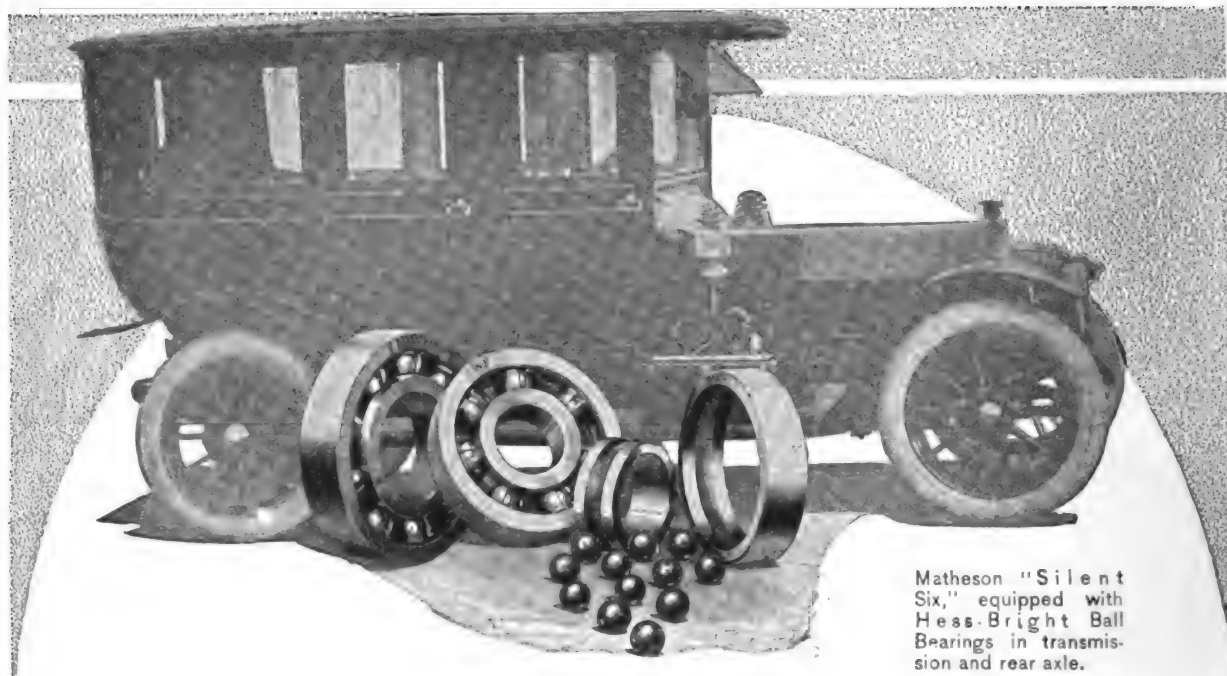
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CIA, GANADERA Y TEXTILE De CEDROS

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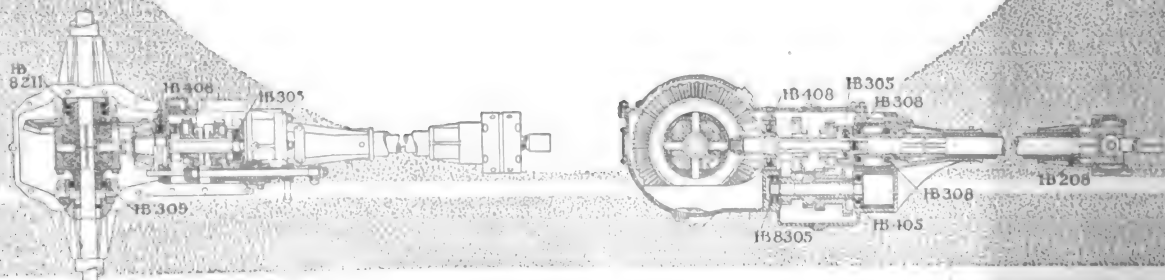
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With *Durable Treads* we will give you a written, legal guarantee for 500 miles without puncture. This is binding whether your tires are new or old, tread-worn, rim-cut or rut-worn. It further guarantees that

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We will ship you a full set or pair, at your request, for your inspection. You send us no money—we assume no obligations—make no promises.

We will pay the express!

Special Discount

If *Durable Treads* are not already represented in your locality, we will allow you our full Dealers' discount. This is merely to introduce *Durable Treads*.

Send Coupon

Get Facts

You are anxious to save \$50 to \$200 every season. We are anxious to show you how. So mail the coupon at once.

COLORADO TIRE & LEATHER CO.

Main Offices:

1208 Majestic Bldg.
Chicago

Branch Factory:
Denver, Colo.



Colorado Tire & Leather Co.,
1208 Majestic Bldg., Chicago, Ill.

Dear Sirs:—Please send me at once, without obligating me, a sample of *Durable Tread Leather*, your booklet "5000 Miles Without Puncture," copy of your Guarantee, details of Test Offer, price of *Durable Treads*, and Special Discount facts.

Name _____

St. Address _____

City _____ State _____

My Tire Sizes Are _____



K&W RELINERS

$\frac{1}{2}$ of 1%

That's the number of replacements that we have had to make during the four years we have had K & W Reliners on the market. The best of material, combined with the best of workmanship, are responsible for the superiority of K & W Reliners.

When a dealer tries to sell you "something just as good" as "K & W"—take the hint. Write us direct. Don't wait for blow-outs and punctures, but reinforce your tires now. Take time by the forelock and double your mileage. K & W Reliners will add 3000 to 5000 more miles to your tires—service practically equal to that given by new standard made tires.

The fabric is the life of the tire. By reinforcing the fabric you get many additional miles of service, besides making punctures and blow-outs impossible. K & W Reliners will easily reduce your tire expense 50 per cent.

When placed in an old casing, a K & W practically vulcanizes itself to the inner fabric and covers up all the cracks and worn spots; reinforces the whole tire in exactly the same way that an inside blow-out patch reinforces one weak spot.

The exclusive features found in K & W Reliners are fully covered by patents and cannot be found in any other reliner made. Every K & W Patented Reliner is backed by our positive guarantee of service and satisfaction.

Dandy Reliners.

As there are many instances where a Reliner would do all work required by reinforcing and preventing punctures (and sometimes not necessary to be made of as good material as our K & W Patent Reliners) we have decided to manufacture a reliable, low priced tire-reinforcement and have succeeded so well that "price and quality" will satisfy any one who is satisfied with any other tire protector on the market.

The Dandy Reliner is built wide. It will reinforce the casing at the edges. It is made of from three to five plies of heavy rubber duck. It is neatly made. It will fit the tire perfectly. It is heavily coated with cement—all ready to insert. It is semi-cured and very pliable. You will be well pleased with the Dandy Reliner.

We also manufacture a LIGHT WEIGHT Reliner made of "two" layers. The LIGHT WEIGHT is excellent for a tire that is "Rough Inside."

PRICE LIST.

	Dandy Reliner	Light Weight Reliner
28x2½	\$2.60	\$2.40
28x3	3.10	2.90
30x3	3.40	3.25
32x3	3.60	3.30
28x3½	3.90	3.50
30x3½	4.05	3.60
32x3½	4.30	3.75
34x3½	4.50	3.85
36x3½	4.70	4.00
30x4	4.90	3.60
31x4	5.20	3.80
32x4	5.40	4.00
33x4	5.50	4.20
34x4	5.70	4.30
36x4	5.85	4.40
34x4½	6.30	4.55
36x4½	6.65	4.80
34x5	6.80	4.85
36x5	7.00	5.25

Write for our K & W Tire Accessory Catalog, containing prices of our "Patent" Reliners. See your Dealer—if he does not sell K & W PRODUCTS, write us for a special price.

K & W MANUFACTURING COMPANY

Denver Branch: 1545 Broadway, Denver Colorado

MAIN OFFICE AND FACTORY: 3rd Street, Ashland, Ohio

Please mention the Automobile Dealer and Repairer when writing to advertisers.

COMPLETE VULCANIZING PLANT \$45

This vulcanizer has revolutionized the tire repair business. It does all the work of the old style vulcanizers costing four times as much and is so simple that any boy who can wash a car can operate it.

Tube plate is 30 x 4 inches. Repairs six tubes as quickly as one. Can be heated independently of the casing attachment.

The double casing attachment repairs casing blow-outs by the well-known wrapped tread method originated by Mr. Shaler. Heat is applied simultaneously to inside and outside of a casing. This method makes a guaranteed repair at less than one-half the cost of the old sectional method.

Also repairs sand pockets and casing cuts with tire on wheel.

Steam is generated in 20 minutes in the copper coil boiler. A gallon of gasoline runs the whole outfit more than a day.

It's a

SHALER

and has the exclusive Shaler feature of a temperature control that is automatic. Simply start the burner and let the vulcanizer take care of itself. A thermostat regulates the flame and keeps the steam pressure just right for vulcanizing. As a check on this mechanism there is a safety valve set to relieve the pressure should it accidentally run above the vulcanizing point.

Write today for full description

Ask for our N. P. R. circular. It tells in detail all about the work you can do with this big machine.

We can guarantee prompt delivery of orders received prior to August 15th.

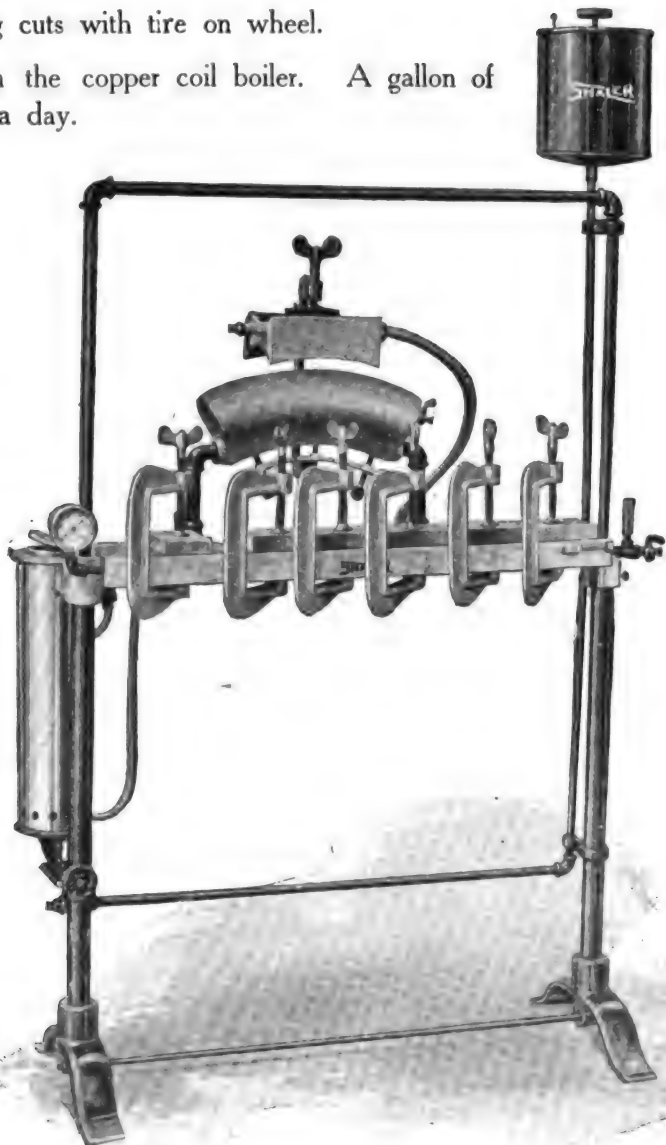
Type N. P. R. Complete Casing and Tube Vulcanizer. List, **\$60.00**

To the Trade, - - - - - **45.00**

Type N. Multiple Tube Vulcanizer. List, - - - - - **35.00**

To the Trade, - - - - - **26.25**

(Both are complete with boiler, generator and all attachments.)



C. A. SHALER CO., 807 SIXTH STREET, **WAUPUN, WIS.**

Manufacturers of the only complete line of vulcanizers in the world.



YOUR business is bound to grow, when advertised by the high grade goods you sell. You can cash in on a reputation of undisputed leadership, won by twelve years of unbroken, supreme quality in manufacture, by handling Firestone accessories.

The same time-tried, and expertly-inspected and tested materials which go into Firestone Tires; the same tire making know-how and minute care, are employed in the manufacture of

Firestone

Accessories

and repairs. These accessories must fit to a standard of efficiency as high as for the tires themselves.

Cementless Patches
"Cure Cut"
Blow-Out Patches
Tire Talc

Pure Gum and Red Wrapped
Tube Patches
Tire Tape
Repair Materials In Packages
Emergency Patches

Lace-On-Boots
Pumps
Air Pressure Gauges
Valves and Valve Parts
Complete Repair Kits

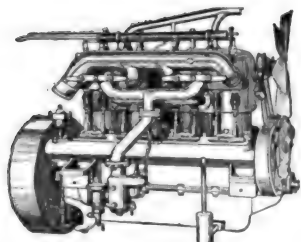
*Our Proposition Saves And Makes
Money For You. Write For It Today*

THE FIRESTONE TIRE & RUBBER COMPANY, Akron, Ohio

"America's Largest Exclusive Tire & Rim Makers"

Branches and Agencies in ALL Principal Cities

Lubricating your cylinders is a problem which you alone can solve, because you know your engine



low carbon, special refining, special grades, etc., etc.

You just have to bring to a mental focus what you know about your own engine and what you know about the practical results from oils you have used. Then make a simple deduction.

If you find your engine is not doing the work it should, if it knocks in climbing an ordinary hill or when it has warmed up with a moderate run, or demands a wide-open throttle on the least provocation of speed or climb, or stalls when it should keep going on a low throttle—the oil you are using isn't doing the lubricating work it should; isn't assisting compression; may be killing your spark with soot and inducing sluggish explosions.

If this oil is a light colored, limpid sort of oil it is lacking in the lubricating function.

It is only good because it "doesn't" carbonize, and you are feeding it so freely to get results that it carbonizes anyway.

If, instead, it is a fairly heavy oil that looks like a rich lubricant, it probably doesn't give results because

YOU need not know oils like an expert; you need not worry through the oil manufacturers' grave advertising talks about finest "Crudes," about gravity, flash, fire test, cold test, viscosity, light colors,

its richness disappears instantly when it hits the zone of high temperature, and leaves a smudge of carbon behind it.

The oil you would select, if you could have your own way, would be *heavier in body* than the pale oils, and *lighter in color* than the heavy oils you have known.

This may be finicky sort of discriminating, but—

MOTOROL

is just that kind of an oil—

Rich in lubricating properties—

Not dark colored with forbidden carbon—

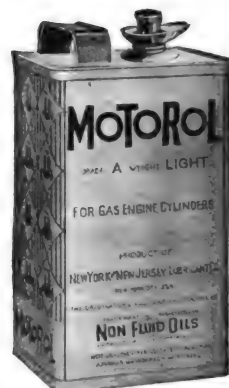
Permanent in body because nature, not science, gives it a strong viscosity—

Free flowing, whether it is a summer or a winter record day.

An oil for new motors and new motorists who want to see the light of economy and long life in their cars.

An oil for old motors and old motorists who have learned and paid dearly for their lubricating lessons.

The oil for you.



We will gladly forward you a sample of **MOTOROL**
Use the attached coupon.

New York & New Jersey Lubricant Co.
165 Broadway, New York

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PHILADELPHIA: 1416 Vine Street

Pacific Coast Distributors: HUGHSON & MERTON

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SAN FRANCISCO

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Please send free sample of Grade "SB"
MOTOROL
Name.....
Address.....
Dealer.....
Address.....
A. D. H.
21

Dealers & Jobbers! Write for our latest low prices on

FORD

Lighting Outfits,
Oil Gauges and
Master Vibrators

THE R. C. HULL ELECTRIC CO.
1821 EUCLID AVENUE, CLEVELAND, OHIO

More Speed and Power with Less Gasoline.

THE M. & M. ECONOMIZER

Is made for obtaining more speed and power with less gasoline.

THE M. & M. IS ALSO GOOD FOR:

Cooling your Engine.
Lubricating the Cylinders.
Saving about 40 to 50% of Gasoline.
Saving the Brakes.
Prolonging the Life of Batteries.
Saving your Clutch and Gears.
Giving you Control over your Car.
Safety Valve in case of Back Fire.
Saving the Electric Current.
Making Hill Climbing EASY.

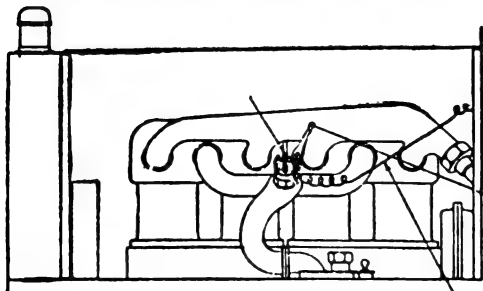
Making Crowded Streets and Rough Roads Easy.

Beware of Imitation! The M. & M. is the Only Patent Device of this kind on the Market.

The M. & M. is made with two valves, one for speeding and power with less gasoline, and one for coasting. It will also increase the power of the motor at least 25%. The M. & M. is attached to the intake pipe. It can be installed on any car on the market. When going down grades, you use no gasoline whatever. What the coaster brake is to the bicycle, the M. & M. is to the automobile. Your car is not complete without it. By using the M. & M. your car is under absolute control at all times, and accidents can be avoided. It is very simple to attach. Any machine shop or garage can install same on short notice. Do not throw your old carburetors away until you have applied this device on your car. Then notice results! This M. & M. is the only known carburetor adjuster on the market to-day.

Act at once! Remember that while you are thinking about giving us an order, you are losing time. You are not only losing time but money also. Don't think! Give us your order at once. We also make a motor-cycle size.

Used with highly satisfactory results by car manufacturers.



The above cut shows the M. & M. attached.

MOLLER BROTHERS CONTROLLER & ECONOMIZER COMPANY
700 BETZ BUILDING, PHILADELPHIA, PA.

Patented in
United States and
Europe.

Price
Complete
\$3.50

AGENTS
WANTED

Money refunded
in 30 days if the
M. and M. fails to
do just what we
claim.

VOORHEES "IDEAL" AUTOMOBILE RUBBER SPECIALTIES

TO SAVE EXPENSE AND
AVOID TIRE TROUBLES



VOORHEES RUBBER MFG. CO.

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MANUFACTURERS OF

Automobile Accessories, Repair Stocks, Etc.

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THE "INNERSHU"



Label Copyright
Found on every original "INNERSHU."

**SOLD UNDER A BROAD GUARANTEE
TO BOTH DEALER AND CONSUMER ALIKE**

PUNCTURE PROOF
Double Tire Mileage and

BLOW-OUT PROOF
Gives Maximum Tire Economy



Ask Your Dealer

There is a demand in every community for a Tire Re-inforcement that will and does relieve the Dealer and his customer from any chance of a "Come Back."

The "INNERSHU" is in a class by itself and gives a distinct prestige for **QUALITY** and **SERVICE**.

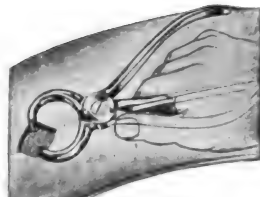
**INSIST ON THE RED "INNERSHU"
WITH THE RED LABEL**

MADE BY
THE INNER SHOE TIRE COMPANY
Grand Rapids, Michigan

The Average Man Can't Afford to Own An Automobile Because of Tire Cost

The following figures, based on the latest tire list; figured on equipment of four tires and tubes, show that a larger proportion of your original investment in a car is represented by tires than any other one part of the car. Now look in your tool kit and see what the manufacturer does to help you *save that investment*. The average tire tool kit consists entirely of tools for the removal of tires and *nothing with which to repair them*.

Size	Four Tires and Tubes	Cost Per Mile
30 x 3 1/2	\$112.60	3.2 cts.
32 x 3 1/2	119.60	3.11 cts.
32 x 4	168.20	4.8 cts.
34 x 4	179.20	5.1 cts.
36 x 4 1/2	244.00	6.97 cts.
38 x 4 1/2	256.60	7.3 cts.
40 x 5 1/2	379.90	10.85 cts.



(Patented)

The average tire is guaranteed for only 3500 miles, therefore your tire expense figures out according to this list.

The majority of the CAR MANUFACTURERS assure me that they believe that in another year they will be *forced by demand* to put GILMER TIRE REPAIR PLIERS in their kit, but that they will *not put them in* until they are *forced to* by demands from their customers. These same manufacturers are about the loudest in their claims of service to the owner, *yet on their own admission they only serve the owner when he makes them*.

Put GILMER TIRE REPAIR PLIERS in your kit. 10,000 Miles of Service

are built into every good tire made—but 99 times in 100 over one-half of that mileage escapes through small cuts, which could be repaired in a few seconds time. This accounts for the fact that tire manufacturers guarantee their tires for only 3500 miles.

The strength of the tire is dependent entirely on the fabric. In nearly every instance where a tire blows out, a close inspection will show that it is due to the neglect of a small cut or puncture which let in dirt, grease and dampness to rot the fabric. Every argument for the repair of tires is an argument for the use of GILMER TIRE REPAIR PLIERS, since no matter how good the gum you use, its efficiency depends on getting it into the cut, NEXT TO THE FABRIC.

If your tire dealer does not carry these, send me his name and \$1.00 for a pair of nickel plated pliers and cleaner. Satisfaction guaranteed. Never a complaint. Customers say, "Best thing on the market for cutting automobile expense." "Will do all you claim." "Every car owner should have a pair." Copy of "Tire Insurance" sent on request.—"Good News for Auto Owners."

G. WALKER GILMER, Jr., Manufacturer, For sale at all of Charles E. Miller's fifteen stores.
50 No. 7th Street, Philadelphia, Pa., U. S. A. Also by St. Louis Rubber Cement Co., St. Louis, Mo.

Sole Agent for Great Britain, T. W. Rickard, 45 Gasmere Road, Muswell Hill, London, N.



Valentine's Vanadium Chassis Finishing

Be in a position to make this answer to the car owner who comes to you for advice and a good job.

The ordinary varnish is so quickly destroyed on an automobile that the painter generally gets the blame. Get the friendship of the car owner instead of his ill-will by finishing his car with Valentine's varnishes,

Vanadium Body Varnish for the body.

Vanadium Chassis Finishing for the hood, fenders, and underparts.

Write a line for booklet, "The Care of the Car."

Valentine & Company

TRADE **VALENTINE'S** MARK

456 Fourth Avenue, New York
343 So. Dearborn St., Chicago
74 Pearl Street, Boston

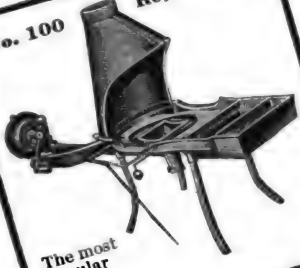


No matter how satisfactory the packing you now use may be, **Endura** is worth a trial, and, once used, is preferred, for it makes a perfect joint. Moreover, it costs less and wears better than any other good oil or water sheet packing. It's the best packing you can use in your car. Anywhere that a thin yet durable packing with exceptional caulking qualities is required on liquids, is a place for **Endura**.

Send for samples and the address of our nearest agent.


ENDURA MFG. CO.
63rd & EASTWICK AVE. PHILADELPHIA

No. 100 Royal Forge



The most popular forge of to-day.

Western Chief Forge, Size XBB



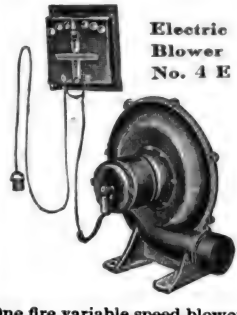
For power shops, or where a forge for heavy work is desired.

Royal (Steel) Forge No. 37



For garages, boiler makers, horse shoers or any first-class forge shop.

Electric Blower No. 4 E



One fire variable speed blower.

When the Name CANEDY-OTTO

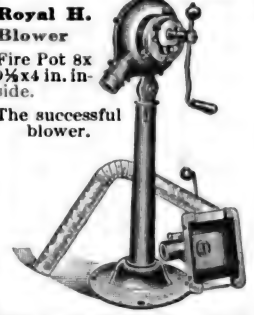
is found on a Forge Blower, Drill or any other Blacksmith Tool that is all the guarantee necessary

We Warrant All Articles of Our Manufacture

SOLD BY JOBBERS AND SUPPLY DEALERS EVERYWHERE

CANEDY-OTTO MFG.CO.
CHICAGO HEIGHTS, ILL. U.S.A.


Royal H. Blower



Fire Pot 8x 9 1/2 x 4 in. inside.
The successful blower.

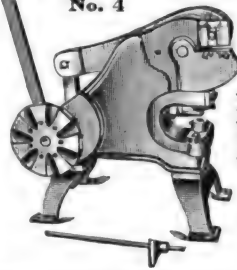
Spur gears used only. Ask the man who owns one.

Electric Drill No. 18




The largest and most perfect drill manufactured. Equipped with class powerful direct drive with spur gear.

Combination Punch and Shear No. 4



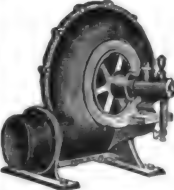
It can be operated toward the front or back. Depth of throat 6 inches.

No. 31 Drill



20-inch up-right drill gear driven. No belts. Has hand lever feed, also power self feed with automatic stop.

Power Blower



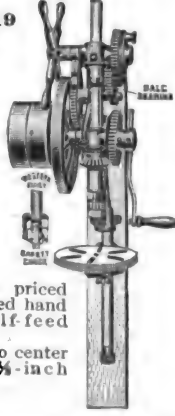
Made in 5 sizes. Adapted to forge fires and light Cupola work. Built for service.

No. 1 1/2 Western Chief Tire and Axle Shrinker



The easiest operated shrinker in the world.

No. 19 Drill



A low priced combined hand and self-feed drill. Drills to center of 16 1/2-inch circle.

COUPON

CANEDY-OTTO MFG. CO.,
Chicago Heights, Ill.

Gentlemen:

Please send me a free copy of your 160-page Tool Catalogue.

Name _____

P. O. Address _____

State _____

Give name of your jobber or supply dealer here _____

AT LAST
PERFECTED

HERE IT IS!

Model-1913 Protector

Has Taken Six Years to Perfect it!

Highest Grade—Longest Life—Lowest Cost

"Built up" for STRENGTH and DURABILITY

Has been run 14,000 miles with perfect satisfaction

We have been determined to build the best all-round Protector on the market. We now **HAVE THE BEST**. The PROTECTOR that has LONG been expected—the ONE that ends ALL Tire Troubles under ANY and ALL conditions, is our MODEL 1913 PROTECTOR. Its Construction in brief: Three-ply Special Chrome-tanned Leather with Long, Staple, Sea Island Fabric between plies of leather, on to the center of this we build an extra tread, using the best Imported Swiss Leather obtainable, tanned by a special process for our use exclusively; this tread is studded with our Special Steel Rivet, making it almost indestructible. Sides studded with Spot Rivets to prevent wear and chafing.

Write for Booklet "Tire Sense," and full detail, with latest proposition. We have Special Offer to make in unassigned territory.

20th Century Tire Protector Co.

Main Office and Factory No. 422 Main St., Midlothian, Texas.
Dallas Office, Pacific and Olive Sts., Dallas, Texas.

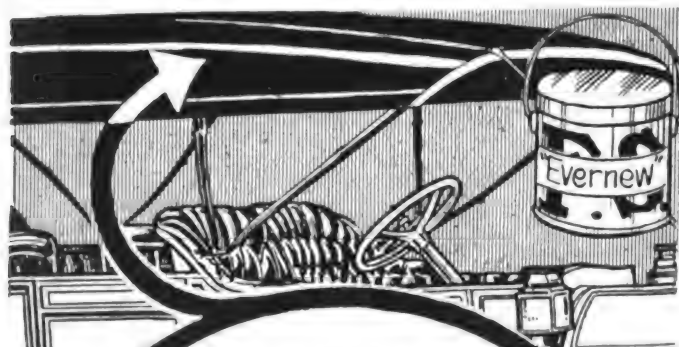
Cut out and send this Coupon today with \$2 for this Emergency Patch.

Give it a thorough trial; if not perfectly satisfactory, return to us, and we will refund your money.

Size of Tire.....

Name

Address



Make Your Auto-
Top Look Like New—Use
Felton-Sibley "EVERNEW"
AUTO-TOP
DRESSING

IT'S the best way to brighten it. Easily applied with ordinary paint brush in a few minutes. Water-proof, weather-proof, dries quickly, will not crack, can't injure the finest top. A fine-appearing, new-looking auto-top adds wonderfully to any car—"EVERNEW" Auto-Top Dressing will keep yours that way all the time. Comes in 8 standard colors—special shades to order. Send for color card and prices.

FELTON, SIBLEY & CO., Inc.

Mfrs. Colors, Paints, Varnishes

136-140 N. Fourth St.

PHILADELPHIA, PA.

"Evernew" Auto-Top Sizing for first coat on mohair, cloth or canvas tops that have never been painted.

"Evernew" Auto-Body Enamel in colors to correspond with "Evernew" Auto-Top Dressing.

11

RIDE ON AIR Laugh at Punctures!

Don't sacrifice the resiliency, vim and snap of your air-inflated tires to a tire-filler. Tire-fillers have been on the market since the days of the bicycle. They never have and never will satisfactorily solve the tire problem. Here is something logical, something that appeals to every motorist's common-sense.

SEALO

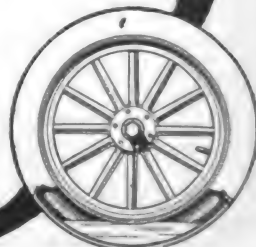
Seals Punctures Automatically

SEALO is a fluid injected into the inner tube through the valve stem. Its principle is that of coagulation, so that any puncture automatically closes upon the withdrawal of the instrument of penetration. SEALO is positively the only puncture-proofing system that does not interfere with the resiliency or proper inflation of the tire. It is guaranteed to prevent leakage of air from punctures or porous tubes, not to injure tubes or casings in any manner, not to harden, freeze, evaporate, or dry for a period of one year. Any one can apply the treatment in ten minutes' time. If tire insurance at 1/2 cent per day appeals to you, write to us for complete information. Prices for treatment of 4 tires from \$10 to \$25, depending on size of tires.

DEALERS: In the next 3 months fortunes are going to be made in handling SEALO. We are already 2 weeks behind in shipments. Get in touch with us today.

Sealo Tire Company

1409 Michigan Ave.
Dept. 812D
CHICAGO



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Do You Repair Cases or Tubes?

No matter how well satisfied you may be with the Cements and Repair Stocks you are now using, it will pay you well to drop us a line **now** for our

FREE Trial Offer No. 2 **ON**

“AMERICAN” **CEMENTS AND REPAIR STOCKS**



5-Minute-Cure Vulcanizing Cement

We are sole manufacturers of this remarkable cement, a cement that is adapted to every requirement of the tire builder and repairman—and we know what their needs are. By vulcanizing in 5 minutes, tubes are mended without injury thru overheating; hot weather leaks are impossible, and you are saved valuable time.

Economical—because only one grade of cement need be carried in stock, and also because of the greatly increased volume of work made possible by shortening the time of cure.

For mechanical goods it is just as superior to any other cement ever offered the trade.

A generous sample goes with our Free Trial Offer No. 2.

Hot Weather Inner Tubes

American Re-inforced, heat-resisting, Inner Tubes are made to stand up under any conditions of heat that they may be subjected to, whether from fast driving or hot weather.

The splices are made with our 5 Minute-Cure Vulcanizing Cement, hence they cannot separate, nor can the valve pad loosen from the tube.

Being double-walled or re-inforced at the base, bead-pinching is almost entirely eliminated, and consequently 80 per cent. of your tube troubles are ended.

A sample of our Pure Gum and “American Indian” Red Inner Tubes are included in our Free Trial Offer No. 2.



Everything for the Repairman

Besides the above, we make a full and complete line of Tread Stocks, Fabrics, Patches, Valve Pads, Tire Protectors, &c., &c., all of the highest quality of material and workmanship, and compounded by our own process to resist heat. Samples go with Free Trial Offer No. 2.

REPAIRMEN: Ask us about the interesting feature of our Contract. Write to-day on your own letterhead for Free Trial Offer No. 2.

THE AMERICAN TIRE & RUBBER CO., - AKRON, O.

The CONTINUOUS MOTION PUMP



You Pump FILTERED GASOLINE—
the exact number of gallons—
directly into your car, without
turning the handle backwards.

Save Just Half Your Time and Labor.
No backing up for another stroke. This **Milwaukee Pump** is SELF-COUNTING, SELF-STOPPING, SPEEDY and SATISFACTORY. It is the one *you* want.

The *underground tank* that goes with every one of our large variety of pumps is also "right up to the minute," being SEAMLESS, RIVETLESS and LEAKLESS.

Send for our Book No. 6, which tells why Milwaukee Systems are *first choice* with so many of the foremost Garages, Factories, Railroads, and other oil users.

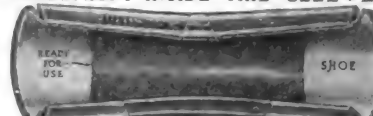
Just Post a Post Card to us, and we will Post *you*.

MILWAUKEE PUMP & TANK SALES CO.
Majestic Building, MILWAUKEE, WIS.

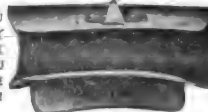
The HAGSTROM Rim-Cut Blowout Patch

Positively repairs rim-cuts.
Repairs all blowouts.
Prevents blowouts.
A permanent repair for old casings.
An emergency repair for new casings.
Saves carrying extra casings.

HAGSTROM INSIDE TIRE SLEEVE



BRINGING YOU HOME IS ONLY PART OF THE SERVICE YOU GET OUT OF THE HAGSTROM SLEEVE



THE PATCH REPAIRS BLOWOUTS IF USED AS THE WHEEL ROLL ON PAVEMENT IT WILL PREVENT A BLOW-OUT OR RIM-CUT AND THUS SAVE INFLATE TUBE

Write today for gas tank key and latest price list of Hagstrom specialties.

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Distributors (LOWE MOTOR SUPPLIES CO., New York City
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M&M YOUR TIRES

By doing this you can Multiply the life of your tires and tubes by three.

M. & M. CEMENT-DOH
COST COMPLETE, ONLY \$1.25

Sent anywhere on receipt of price, or you can get it of any dealer or jobber.

No skill is needed to use this best of all repair outfits. With it anyone can make a quick, permanent repair. Just follow directions, and you can fix any cut, any puncture, any slit, any hole, any tear, any blowout, in any casing or inner tube, and do the work better, cheaper and quicker than it can be done by heat vulcanizing.

Repairs made with an M. & M. Outfit are permanent and self-vulcanizing.

Send for an M & M. Outfit today. If you are not satisfied you can have your dollar and a quarter back.

A postal brings our book—
"Money Saving Facts."

THE
M. & M. Mfg. Co.
AKRON, OHIO.

MAKERS OF THE CELEBRATED M. & M. CEMENT

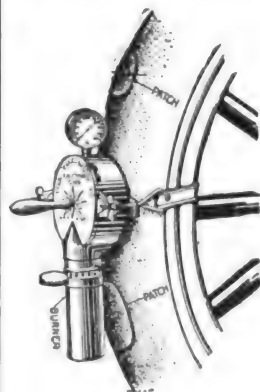


Direct from Factory to You. We Save You the Middleman's Profits.

30,000 Vulcanizers Now in Use

Don't Worry—Send for a

Star Vulcanizer

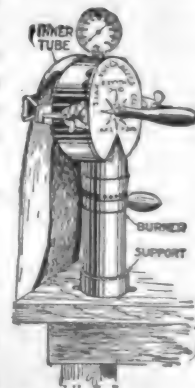


It is the small cuts that cause the trouble—into which the sand and foreign matter works—between the rubber and the canvas fibre layers that cause the big holes, blisters and blowouts. This can all be avoided by using a **Star Vulcanizer**. If the average autoist were to examine his tires once a week and vulcanize the small cuts, the tire trouble would be a thing of the past. You vulcanize the casing right on the wheel and the inner tube as you see it in the cut.

COMPLETE OUTFIT AT **\$6** CASH WITH ORDER

The Star Vulcanizer Mfg. Co.

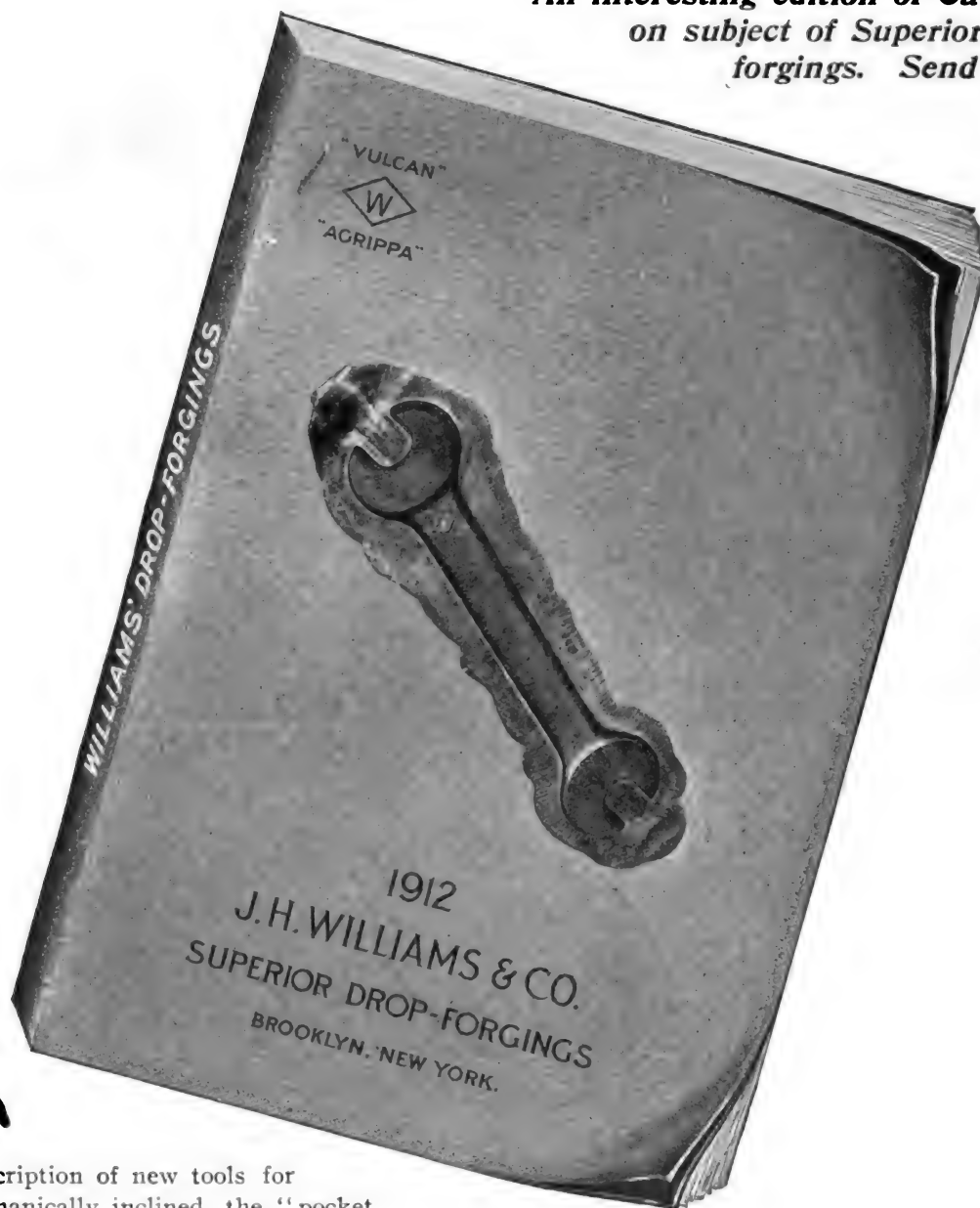
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**Crank Shafts
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It cleans, polishes and protects the finish.

Does not leave a greasy surface.

Easy and convenient to use.

A few drops of Golden Star Polish used on the dust cloth and your car looks bright, clean and new.



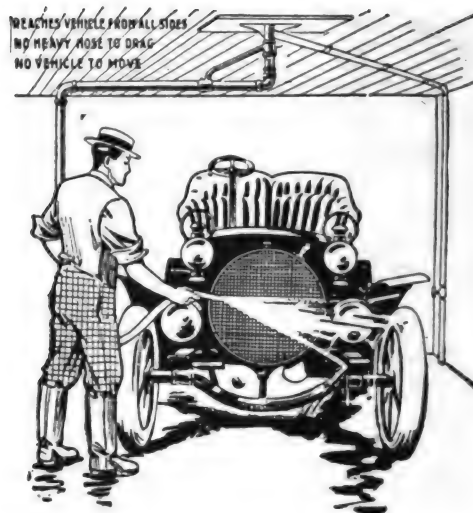
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Let us prove (without cost to you) the merits of Golden Star, "The World's Best Cleaner and Polisher." Ask your dealer for a free sample or write us and it will be sent you at once.

DEALERS—Your customers will appreciate good service. Sell them Golden Star Polish. Ask your jobber—he can supply you.

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Incorporated
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IN OPERATION

It saves time, labor and money. It keeps the hose off the floor. It drains both ways. It is made of malleable and wrought iron. It is sold on honor and guaranteed.

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SPECIAL SALE Price \$8.00

We will ship you one of our Overhead Washers on 30 days trial, if not satisfactory to be returned at our expense.

Manufactured under our own patents and guaranteed by us.

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Have you an Oil Gauge on your Crank Case?
If not—Get one to-day.

This Gauge will indicate the exact level of the oil in your Crank Case!

\$1.00

Prepaid Insured Mail.

PRICE

COMPLETE,
\$1.00.



No. 42 Ford Oil Gauge

Takes the place of lower Pet-Cock on Crank Case. Saves its cost in Oil every month.

YOU KNOW WHAT IT IS.

This ad. requires no further explanation. Send \$1.00 for one today. Your money back if not satisfactory. We also want to hear from the Dealers.

E. EDELMANN & CO.

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Largest Manufacturers of Automobile Gauges in the World.

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"I have found it"

An AUTOMATIC ELECTRIC STEAM VULCANIZER



The Gwynn-Bacon Automatic Steam Vulcanizer is the only Electrically heated vulcanizer that uses steam, and is automatic in its operation.

Absolutely guaranteed not to burn a tube or require watching.

Written guarantee for one year that it will never cause you any trouble.

Made in three sizes—for the private owner, for the small Garage and for the Garage doing a large business in tube repairing.

We also make glue pots that have the same Automatic control, that will keep the glue at an even temperature at all times, thereby saving in a year's time several times its initial cost.

Send for Catalogue of prices and terms, with copy of guarantee.

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carries its own guarantee stamped on its face—do you recognize it? If you possess anything that bears this trade-mark you may be sure that you are going to get a lifetime of service out of that particular article. If you don't—it's your own fault, for we cheerfully replace anything that breaks at **any time, for instance.**

Mossberg Socket Wrench Set No. 10

Universal Automobile Set

For use in Automobile repair and Garage equipment.

In wooden case containing:

- Mossberg Ratchet Handle No. 350.
- One extension bar.
- One universal joint.
- Two screwdriver bits.
- 19 Mottled, case hardened, pressed steel sockets.
- 2 special spark plug sockets.

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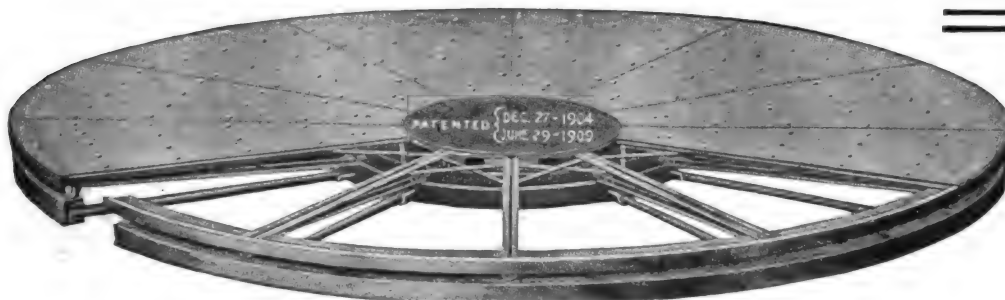
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TOTAL DEPTH 12-IN.



CONCRETE ANY DEPTH AND GROOVED TO WATER DRAIN

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Are you ready to order YOUR "UNIVERSAL?"

"UNIVERSALS" are easiest to turn, easiest to install and easiest to keep in order—they never need repairing.

Made in four sizes to accommodate any size and weight car.

Only twelve inches in depth to allow installation in either ground or upper floors.

So easy to operate a child can turn them.

due to their superior construction and to the Serpentine Ball Bearing Race Course.

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and further information? We also make the "UNIVERSAL" Auto-Jack and Emergency Truck, and "The Handiest Tool in the Shop" Portable Floor Crane and Hoist—two other great garage conveniences.

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REMINGTON (2 PART) DIE WILL PUT AN END TO YOUR THREAD TROUBLES

The only Adjustable Die
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Truly Adjustable to Exact

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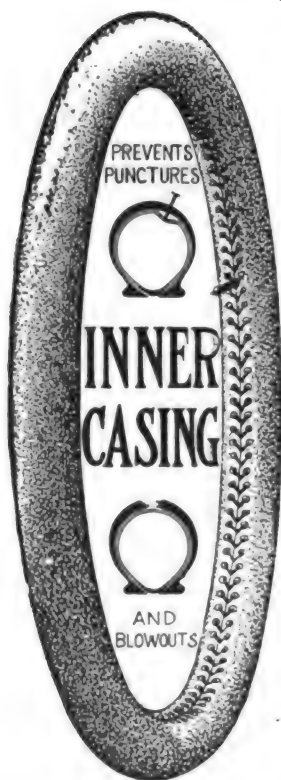
It can be Sharpened same
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It will Outwear at Least
Six Ordinary Dies

The Teeth are Keen and
Free Cutting when new
and can be kept so as
long as the Die lasts

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HOW TO PREVENT TIRE TROUBLES



Is very clearly and fully
explained in our little booklet

"THE CARE AND WEAR OF TIRES."

If you own an automobile,
you cannot afford to be without
it, as it will help you to

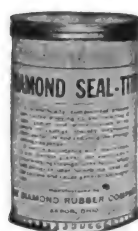
REDUCE TIRE EXPENSE 50% to 75%.

It tells you how to make new
tires last 10,000 miles and over.
It explains how to wear out
your tires without the great an-
noyance of blowouts, and how
to keep your tires in proper
repair.

We will send a limited num-
ber of these valuable little book-
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Diamond SEAL-TITE

Gives the Dealer
Two Profits

1st. A direct profit on every can sold.

2nd. An indirect profit because it satisfies
your customers and brings them into
your store to buy other accessories of
the same high quality.

SEAL-TITE is a putty-like gum that is kneaded
into a cut after the cement has been applied. Repairs
both casings and tubes.

SEAL-TITE and cement are packed in separate
cans which fit into a combination can—see illustration.

SEAL-TITE is being advertised extensively. We
can furnish you with attractive Seal-Tite folders for
distribution among your trade.

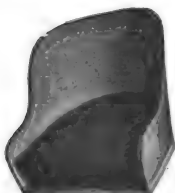
We want you to cash in on this advertising by put-
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THE DIAMOND RUBBER CO. of N. Y., Akron, O.

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ACETYLENE
WELDING A
SPECIALTY

RADIATORS
REPAIRED
BY EXPERTS

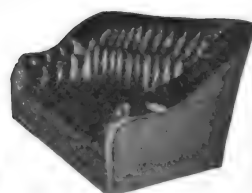


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SEATS AND BODIES FOR ANY CAR

Special seats for the Maxwell, Buick,
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or any car. Special Bodies made to
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give model and name of your car.

SEATS, \$10.00 to \$45.00
FENDERS, \$10.00 to \$30.00



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Fore Doors
For Any Car



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The Incomparable 400 Blower, the one greatest Heirloom that will be handed down from one Generation to the other. Ask what the owners say.

The 400 Steel Blower will serve the youngest mechanic faithfully without expense for a long lifetime.

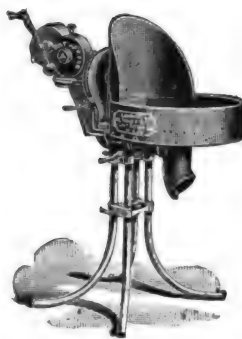


Crank turns either way

The Famous 400 Champion Steel Blower



No. 408 Steel Blacksmith's Forge
Over one-half million 400 Champion Steel Blowers and Steel Forges in use. Forever run easy, smooth and noiseless.

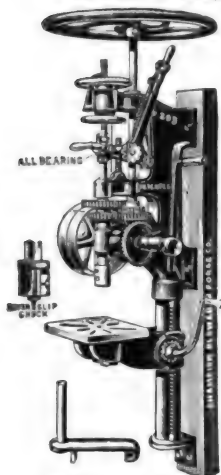


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20-inch Double Back Geared Upright Power Drill is furnished with three complete feeds and is suitably adapted for machine shop and garage use. If you are in need of a power or hand driven Drill write us for full information concerning our complete line.



20-inch Drill

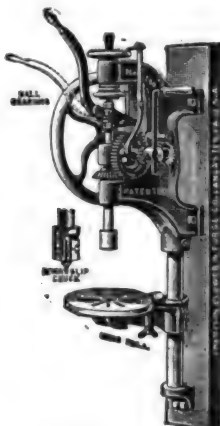


No. 203 Self-Feed and Double Compound Lever-Feed Drill

Champion "Patented" Automatic Self-Feed and Lever-Feed Upright Post Drills.

Made with Ball Bearings only. With the Lever- or Automatic Self-Feed 95 per cent in Time and Labor is Saved by the Instantaneous Raising of the Drill Bit out of the hole just bored and again replacing the drill bit back on the material ready to bore the next hole. Remember—There is NO TURNING BACK of the Screw Nut with EITHER FEED.

All the Leading Dealers Carry a Stock of CHAMPION GOODS.



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Before purchasing a Hand Blower, Forge, Drill Press, Tire Bender, Tire Shrinker, Screw Plate, Power Blower or Electric Blower, write for our free catalogue, which always shows the greatest variety of improved blacksmith tools built under one control in the world.

THE CHAMPION BLOWER & FORGE CO.,
LANCASTER, PA.,
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No. 440 Electric Forge

PATENTED FEB. 27, 1912.

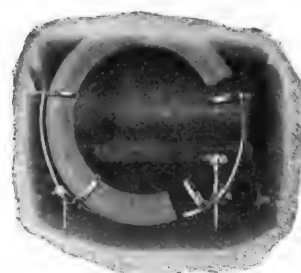


Badger Running Board Tire Holder



Badger Wind Shields

PATENT APPLIED FOR



Badger Rear End Demountable Rim and Tire Holders

Badger Ford Bumper



AUTO PARTS MFG. CO.

(Badger Accessories)

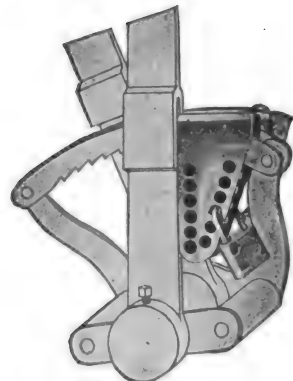
Patent was granted on our Badger Running Board Demountable Rim and Tire Holder Feb. 27th, 1912, by the United States Patent Office. All persons are cautioned against using or selling infringed Badger Tire Holders, as there is a liability.

AUTO PARTS MFG. CO.

161-171 Michigan St., Milwaukee, Wis., U. S. A.

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Badger Lock Clamp



MAKE MONEY REPAIRING TIRES

BOLTLESS TIRE KETTLES



CASING REPAIR VULCANIZERS
AIR COMPRESSORS and TANKS
STEAM BOILERS
INSIDE PATCH VULCANIZERS
TUBE REPAIR VULCANIZERS
POT HEATERS and STEAM VULCANIZERS
COIL SPRINGS FOR RETREADING
RETREADING MOLDS
ROTARY RASPS
WIRE BRUSHES, Etc., Etc.

The Boltless, Quick Opening Tire Kettle and other devices shown in our New 1912 Catalogue insure best results from the smallest investment.

With this kettle you can cure a retread as easily as a sectional repair. **There is not a single bolt to tighten.**

Give your customers quick service by curing retreads as fast as they are built up.

You can make money repairing tires either as part of a garage and general repair business or as a separate venture. Requires very little capital to equip a shop completely with the best tire repairing outfit in the world. The equipment can be paid for and a good profit made by the first season's work. Every motorist must have tires repaired—every motorist in your vicinity is a possible customer for tire repairing.

Get the right kind of equipment—one that produces work that you can guarantee—the Akron-Williams Tire Repair Equipment which was designed by practical tire factory repairman.

Localized heat is the secret of the Akron-Williams. Three separate steam chambers in each of our sections, our exclusive patented feature, limit the curing process to the repaired part.

Proof that the Akron-Williams is the best is the fact that the big tire manufacturers use it—Firestone, Goodyear, Diamond, Republic, Pennsylvania, Revere, Hartford, Consolidated, Empire, Manhattan, Shawmut and many other tire manufacturers are among our customers. They know by experience what is most practical. We can equip a tire repairing plant of any desired capacity. Don't delay getting into this profitable business.

Get into correspondence with us to-day.

THE WILLIAMS FOUNDRY & MACHINE CO., Glendale Avenue, Akron, Ohio



AIR ALWAYS ON TAP

ALL YOU WANT—AT RIGHT PRESSURE—NO WAITING

CURTIS COMMON SENSE GARAGE PUMP

← WILL LAST A LIFE TIME →

For Stationary or Portable Service—Belted Direct to Motor or Line Shaft—Will Furnish All the Air Ordinarily Required About a Garage—or Air for Your Sprinkler and Water Supply Systems.

CONSTRUCTION DETAILS

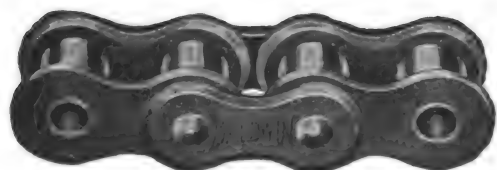
Vertical up-plunger type—will not carry oil over into the tires. Fewest possible number of parts, hence less friction, less power required, less oil and fewer adjustments. Fan shaped fly-wheel arms direct a cyclone of air on cylinder radiation flanges. Springless intake valve in the piston head that insures prompt valve action.

WRITE US TO-DAY FOR PARTICULARS AND PRICES.

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2"x2½"
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Baldwin Chain and Mfg. Co.

makes automobile chains both riveted and detachable—
all sizes in stock.

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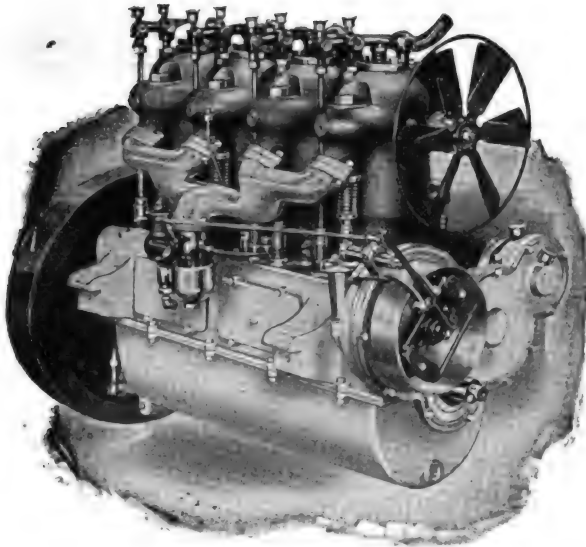
Sprockets made to order.

Send for Quotations and Circulars

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That we furnish engines for farm tractors, railway locomotives and commercial vehicles of all kinds, is evidence of the range of our work and the stability of our construction.

Model Gas Engine Works

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OUR LINE IS COMPLETE.

WRITE for the following catalogs of the line in which you are interested:

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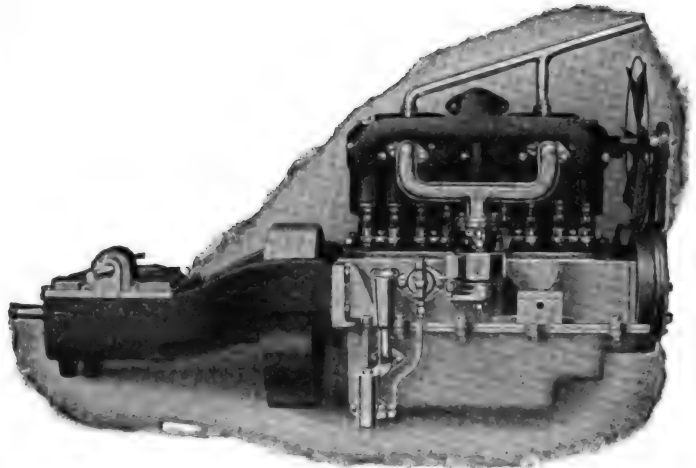
No. 21.—22 H. P. unit power plants with 3 forward speed transmissions.

No. 19.—Wells clutch.

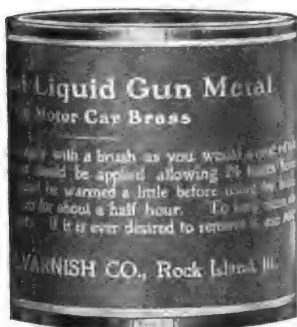
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TIRED OF POLISHING BRASS?



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U-Vulk The One Minute Liquid Vulcanizer

Will enable you to permanently Vulcanize your own Tires and Inner-Tubes in one to ten minutes. No Acid used in the manufacture of U-VULK; No Heat Required; Therefore No Possible Chance of Burning the Tire or Tube.

A FULLY GUARANTEED ROADSIDE REPAIR KIT.

Complete outfit, enough for 50 permanent repairs, \$2.50 prepaid.

Write for descriptive folder to-day.

Live dealers and agents wanted in uncontracted-for territory.

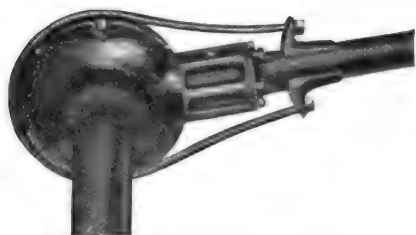
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The Gardner Patented Rear Axle Truss



**WILL STRENGTHEN YOUR FORD
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Stops that chattering and vibration.
Keeps the grease in and the dirt out.
Can be installed on car in three minutes.
Short truss for 1910 cars with babbitt bearings.

Long truss for 1911 cars with roller bearings.

Special long truss for 1912 cars.

All sizes for \$3.00 each
F. O. B. Chicago

Write for scheme for getting pistons out of
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"GRIFFITH'S IMPROVED" —AND— "INDEPENDENT" TIRES SOLD ABOUT $\frac{1}{3}$ OFF NEW APRIL STANDARD LIST.

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We sell them to you either guaranteed or unguaranteed.

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Size	Our Unguaranteed	Our Guaranteed	Tubes
28 x 3	\$8.82	\$10.71	\$3.13
30 x 3	9.45	11.48	2.28
30 x 3½	13.90	16.87	3.09
32 x 3½	14.84	18.02	3.25
34 x 3½	16.14	19.59	3.46
30 x 4	19.04	23.12	4.00
32 x 4	20.48	24.86	4.21
34 x 4	21.91	26.61	4.46
36 x 4	23.35	28.35	4.69
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**Largest dealers of STANDARD MAKES
in U. S.**

"INDEPENDENT" guaranteed tubes, 30% off.
Q. D. FLAPS, free.

Goods shipped with examination privilege. Money refunded
on goods returned intact within a week.

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ED. C. GRIFFITH, President.

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— Something New — Rex Velvet Nickel Polish

MADE ESPECIALLY FOR
POLISHING, PROTECTING AND CONSERVING
NICKEL PLATED LAMPS
GERMAN SILVER REFLECTORS
AND ALL SILVER AND NICKEL
PLATED ACCESSORIES

For which articles no other polish is so good

Performs the twofold operation of polishing both the glass and
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Soft as velvet.—Does not wear away the Nickel or German Silver
more than a thousandth of the extent any polish for general use does.

Leaves the plating protected from corrosion

Fills—a—long—unsatisfied—demand

Quickly saves its cost

Retail price 50 cents

Made by the manufacturers of the
EVER-SATISFYING, PATRONAGE-HOLDING

REX STAPLES

REX METAL CREAM POLISH,
REX WOOD OIL and
REX LEATHER DRESSING

Now selling all over the civilized world

ARMIGER CHEMICAL CO.

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Save Strength, Temper, Time, Tires with the Brown Impulse Tire Pump



Unless you *enjoy*
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your tires with a
hand pump you
need a Brown Im-
pulse Tire Pump.

It's so simple to
attach and to oper-
ate, so efficient, so
compact, so dur-
able, that you can't
afford to strain,
sweat and swear
over the old-fash-
ioned, back-break-
ing hand pump.

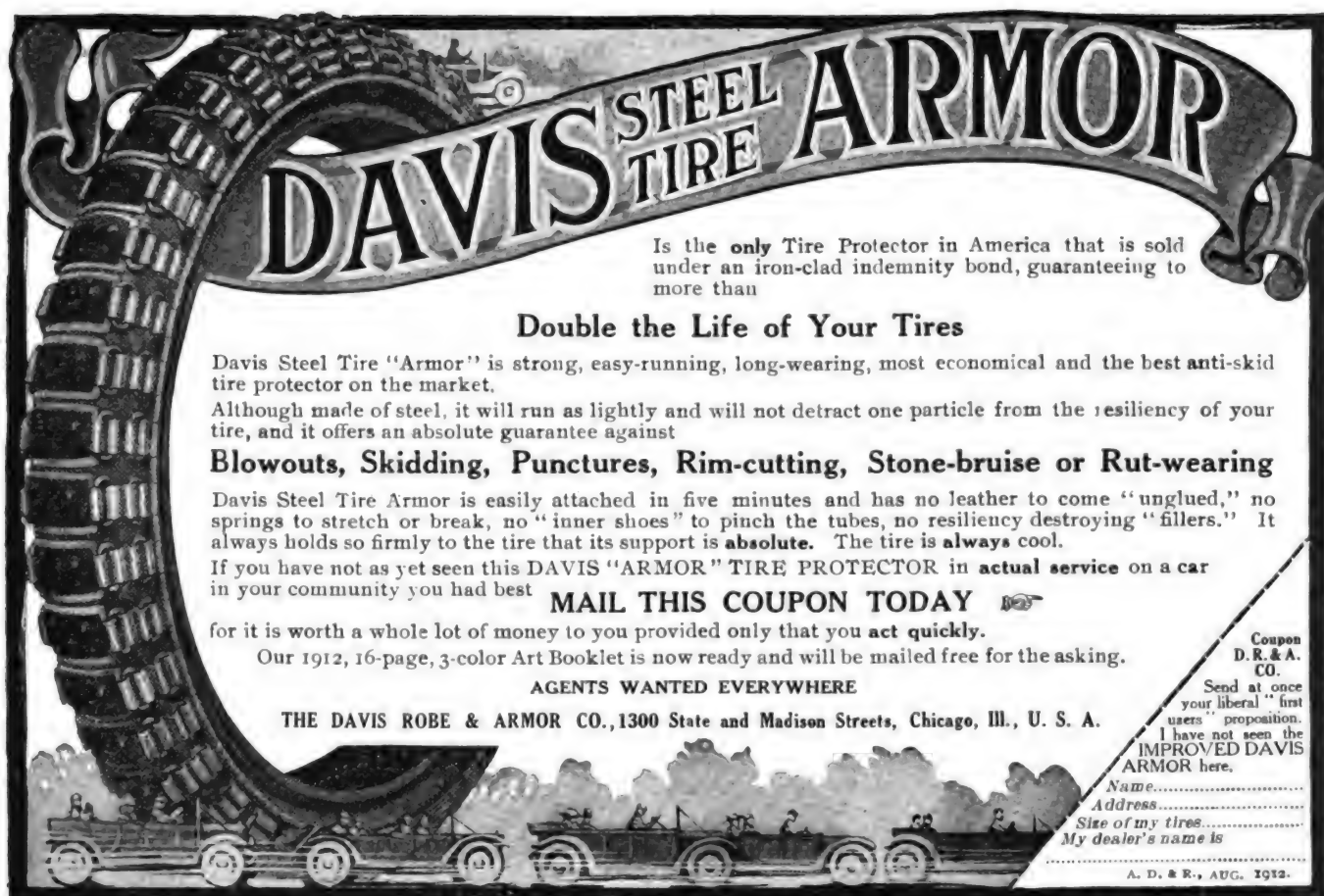
The BROWN sells
for \$15.00. It's the
only tire pump that
comes complete
with high grade re-
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self-opening valve
connection.

Ask your dealer, or write us for full information.

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DAVIS STEEL TIRE ARMOR

Is the **only** Tire Protector in America that is sold under an iron-clad indemnity bond, guaranteeing to more than

Double the Life of Your Tires

Davis Steel Tire "Armor" is strong, easy-running, long-wearing, most economical and the best anti-skid tire protector on the market.

Although made of steel, it will run as lightly and will not detract one particle from the resiliency of your tire, and it offers an absolute guarantee against

Blowouts, Skidding, Punctures, Rim-cutting, Stone-bruise or Rut-wearing

Davis Steel Tire Armor is easily attached in five minutes and has no leather to come "unglued," no springs to stretch or break, no "inner shoes" to pinch the tubes, no resiliency destroying "fillers." It always holds so firmly to the tire that its support is **absolute**. The tire is **always** cool.

If you have not as yet seen this DAVIS "ARMOR" TIRE PROTECTOR in **actual service** on a car in your community you had best

MAIL THIS COUPON TODAY

for it is worth a whole lot of money to you provided only that you **act quickly**.

Our 1912, 16-page, 3-color Art Booklet is now ready and will be mailed free for the asking.

AGENTS WANTED EVERYWHERE

THE DAVIS ROBE & ARMOR CO., 1300 State and Madison Streets, Chicago, Ill., U. S. A.

Coupon
D. R. & A. CO.
Send at once your liberal "first users" proposition. I have not seen the IMPROVED DAVIS ARMOR here.
Name.....
Address.....
Size of my tires.....
My dealer's name is.....
A. D. & R., AUG. 1912.

Automobile Garage Sets Prepaid



"Adamantine" Screw Plates

This Double Stocked Plate Cutting Eleven Sizes, $\frac{1}{4}$ to 1", **\$18.75.**

A. L. A. M., U. S. or V. Standard

Send for Our Threading Tool Catalogue.

American Tap & Die Co.
Greenfield, Mass., U. S. A.

Seamless Steel Tubing

Over 1,000,000 Feet on Hand.

SEND FOR OUR LIST.

1500 SIZES.

YOUR SIZE IS HERE.

ALSO COLD DRAWN SEAMLESS TOOL STEEL TUBING.

WRITE NEAREST OFFICE

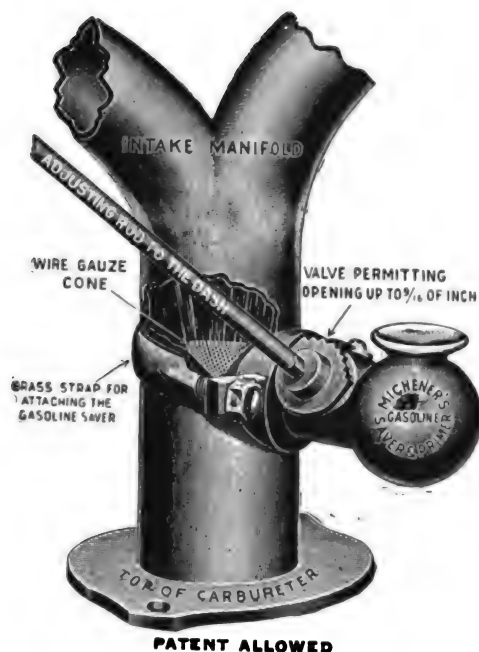
GEORGE NASH CO.,
217 Pearl Street
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EDGAR T. WARD & SONS
25 Purchase Street
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FIELD & CO., Inc.
118 N. Seventh Street
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Please mention the Automobile Dealer and Repairer when writing to advertisers.

MICHENER'S GASOLINE SAVER AND PRIMER



Proper carburetion is the most necessary requirement of satisfactory motor operation. This device will insure perfect carburetion under all conditions. It will positively save you at least 25 per cent. of the gasoline you now use.

It will remedy carbon deposits in your cylinders, sooty spark plugs, pounding, back-firing, overheating, black smoke, and all the other troubles due to a faulty auxiliary air supply.

The Gasoline Saver is a simple device controlled by an adjusting rod on the dash. Regardless of low speed or weather conditions, it admits the "just right" amount of auxiliary air consistent to a mixture of highest efficiency. By breaking up and mixing the gasoline globules with sprays of air, it proves a fuel economizer as well as a power producer. It pays for itself many times over in the gasoline it saves you and in the added service it gives your motor.

With this device you can prime your motor when it offers any difficulties in starting by simply pouring some gasoline in the bowl of the Gasoline Saver, and giving the valve a small opening before cranking. This method of priming is infallible. It is the surest "engine starter" known.

Use your motor as a brake when coasting down hill. Close the throttle and open the air valve. It feeds the motor pure cold air, saving gasoline, cooling the cylinders and saving the brakes.

Some Unsolicited Testimonials

MAXWELL

Willow Grove, Del., June 24, 1912.
E. S. Michener, Newcastle, Pa.
Dear Sir:—With your *Gasoline Saver* on our Maxwell car we gain a speed from 15 miles per hour to 25 miles per hour on the same throttle opening, by admitting air through the Gasoline Saver. Now this is a fact and we are ready to prove it at any time. Some of our customers thought it some sort of trickery.

(Signed) H. H. SMITH & BROS.
Steam & Gasoline Engine Dealers.

FORD T

Washington, D. C., May 6, 1912.
E. S. Michener.
Dear Sir:—I have used your *Gasoline Saver and Primer* on my Ford T with fine success. I have driven this car about 15,000 miles and am therefore familiar with it. The Gasoline Saver was attached one month ago and I find that it improved the running of my engine, gives more power on the same or less gas and is fine for priming the motor.

Yours truly,
(Signed) A. C. SHANNON,
Mgr. Loose-Wiles Biscuit Co.

COLE 40

Buffalo, N. Y., June 13, 1912.
E. S. Michener.
Dear Sir:—I have increased the mileage of my Cole 40 from 10 to 12 miles per gallon to 15 to 17 miles per gallon, and feel very much satisfied with the results.

(Signed) S. PIER,
Niagara, Lockport & Ontario Power Co.

RAMBLER

Pittsburgh, Pa., May 21, 1912.
E. S. Michener.
Dear Sir:—The *Michener Gasoline Saver* which I purchased from you last February has proven very satisfactory. I have tried it out thoroughly on a Rambler Cross Country car and it does more than you claim for it. You should call it Gasoline Saver and Power Producer. It is just what is needed to get the adjustment while running on the road. I believe it increases the power 15 per cent., besides saving the gasoline and keeping the engine cool.

Very truly yours,
(Signed) L. G. MARTIN,
Rambler Pittsburgh Dealer.

CADILLAC

Steelton, Pa., May 3, 1912.
E. S. Michener.
Dear Sir:—I have had your *Gasoline Saver* on my four cylinder Cadillac touring car for several months and it is giving surprising results. Besides saving gasoline it causes the engine to run smoother and develop more power. The longer I use it the better I like it. Very truly yours,
(Signed) A. R. CALDER.

MARION

Lebanon, Pa., April 2, 1912.
E. S. Michener.
Dear Sir:—The *Michener Gasoline Saver and Primer* which I have installed on my Marion Bob Cat Roadster does all and more than you claim for it. I have driven motor cars since 1902, but never have I seen any device so simple in construction work such phenomenal results. It will pay for itself in gasoline saved in one month.

Very truly,
(Signed) CLARENCE S. WEIMER,
Sec'y Weimer Machine Works Co.

These are but a few of the many advantages the Gasoline Saver offers. Ask your dealer or let us tell you about its other features, just as important.

E. S. MICHENER, 800 Washington St., New Castle, Pa.

AUTOMOBILE

Bodies, Chassis, Wheels, Steering Devices, front and rear Axles, Steel Rims, etc.

GET OUR PRICES AT ONCE.

BORBEIN AUTO CO.



2109-2111 N. 9th Street,
ST. LOUIS, MO.

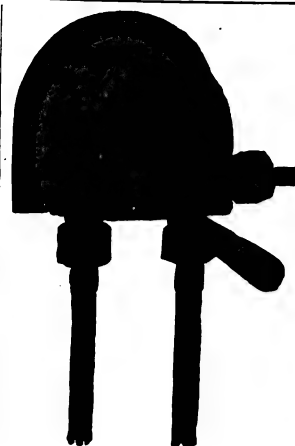


Pat.
applied
for.

The Vulcan Puller

A tool for the garage and repair shop. Used for removing automobile gears, wheels and pulleys. Also for straightening automobile axles and frames. A card will bring you full description.

Winchester Machine Works
Winchester, Ind.



The
Only
Successful
Lighter

The Inst Lighter

The true solution of the motor car lighting problem. In use on over fifty thousand of America's best cars. Easily attached to any car. Attractive dealers' proposition.

Send for Circulars and make money.

THE INST LIGHTER CO.

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Used by the leading Automobile and Axle Manufacturers in America.

THEY KNOW WHY.

ASK FOR IT BY NAME

AUTOBESTINE.

Send for Descriptive Circular.

WOVEN STEEL HOSE & RUBBER CO.

Trenton, N. J.

NATIONAL SALES CORPORATION,
FACTORY SALES MGR.

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250 W. 54th St.

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844 Woodward Ave.

Please mention the Automobile Dealer and Repairer when writing to advertisers.



20,000 FORD CARS ARE NOW EQUIPPED WITH MASTER VIBRATOR. WHY?

If the K-W Master Vibrator did nothing more than simply replace the four separate vibrators on a coil, it would still be worth every cent of \$15.00.

IT DOES A GREAT DEAL MORE.

It is so designed as to utilize the alternating current of the Ford Magneto and make the coil produce a MUCH HOTTER SPARK than it could produce with any other vibrator.

It is NOT A VIBRATOR in the ordinary sense, but a scientifically constructed MAGNETIC CIRCUIT BREAKER which times the spark more accurately than the ordinary High Tension Magneto.

No matter what coil you now have, whether it has four vibrators or one, THE K-W MASTER VIBRATOR will give you:

A HOTTER SPARK, preventing sooty plugs and carbonizing.
MORE POWER. It makes the hills "Fade Away."

EASY STARTING, due to the hotter spark.
INCREASED SATISFACTION with your car.

EASILY PUT ON IN HALF AN HOUR, no changes in car necessary.

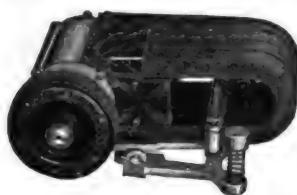
OUR GUARANTEE. If you feel that you can get along without it, return it within 30 days,—money back and no questions asked.

PRICE, \$15.00. Express prepaid if cash accompanies the order.

By the time this is printed there will be many more than 20,000 in use. The numbers run consecutively, and there are no blanks. Notice the number of the one you buy.

The K-W Electric Road Lighting Outfit \$50.⁰⁰

This outfit is the same as our \$15.00 Ford Lighting Outfit with the addition of a \$35.00 Low Tension K-W Magneto, which can be mounted on almost any car to run the lights at night and can be switched off in the daytime or used for ignition with coil and timer. High Tension Magneto is for ignition only.



Low Tension.....\$35.00

NO Moving Wires. NO Brushes.
NO Commutator. Runs in Ball Bearings. Starts engine without batteries.



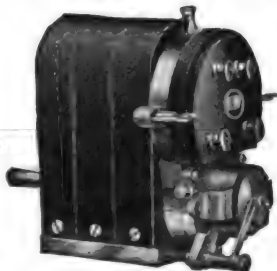
The K-W Spark Coil.

Single Cylinder.....\$12.00
2-Cylinder.....18.00
4-Cylinder.....30.00
6-Cylinder.....42.00

The K-W High Tension Magneto

For any car having provision for Magneto.

Model J
Guaranteed
to Start Auto
Engines up
to 30 H. P.



No Coil
No Timer
No
Batteries
4 Cyl., \$50
6 Cyl., \$55

Extremely simple. Perfectly reliable.

We make larger Magnetos for larger engines.

If you cannot gear-drive a High Tension Magneto, use one of our \$35.00 Low Tension belt or friction-drive Magnetos and a K-W Spark Coil.

WRITE FOR DETAILS.

The FORD Electric Road Lighting Outfit \$15.⁰⁰

Choice of Either Straight Body or Bullet Shaped Lamps.

THE SUCCESSOR TO THE GAS TANK. Current Direct from Magneto.



The K-W Outfits manufactured for this purpose are not makeshifts, but are complete in every detail.

The Outfit complete, which is all you need, consists of

- 1 pair complete Head Lamps
- 2 Tungsten bulbs, 2-1/16" in diameter,
- 12 feet wire, all soldered to lamps,
- 1 Lighting Switch.
- Instruction Sheet for Wiring.

The Lamps are made entirely of one piece of brass drawn from steel dies; have no soldered joints, easy to polish, and make a handsome lamp for the Ford cars. They fit the forks furnished on the Ford cars.

The Light which this outfit gives is vastly superior to either a generator or a gas tank.

The Bulbs have a Tungsten filament of the proper voltage and amperage, which will not interfere with the ignition, and have the Edi Swan or Bayonet base, impossible to fall out and injure the silvered reflector like the screw base.

SPECIAL Outfit de Luxe, \$17.00

For those who want something "extra swell" or "classy" for the touring car, we can furnish, if desired, a 9" bullet shaped lamp which also fits the prop furnished on Ford cars.

The regular 8" lamp is, however, as large as required to catch all of the rays and throw all of them forward, and a larger lamp than this is merely for looks.

For Black Finishing add \$1.00 to price of either outfit.

WE PAY THE EXPRESS East of the Mississippi River or to the Mississippi on points beyond on any of our goods, when cash accompanies the order.

Write for CATALOGUE
SEVENTEEN

2817 CHESTER AVE.
THE K-W IGNITION CO.
CLEVELAND, OHIO. U.S.A.

UNIVERSAL TIRE PROTECTORS



not only save your tires from the wear and tear of road contact, making new casings last indefinitely and giving renewed life to old casings, but they are superior mud and sand creepers. With your tires equipped with "UNIVERSAL" tire protectors you can go and come when you please regardless of road conditions and be certain of getting back safe and sound. No need for extra tires—no delays or annoyance and expense on account of tire trouble. The saving effected through the use of "UNIVERSAL" tire protectors

will ordinarily more than pay for your gasoline and the general running expense of your car from season to season. They fit any and all makes of tires, and are as easy to install or remove as quick detachable tires. Special offer to users in unoccupied territory.

Write us today for price lists and discounts.

UNIVERSAL REPAIR BOOTS

are made in three types, the Ratchet Anchor, as shown in cut, Armored Clincher, and Plain or Unarmored Clincher. All types made in 9 in., 12 in., 15 in. and 18 in.

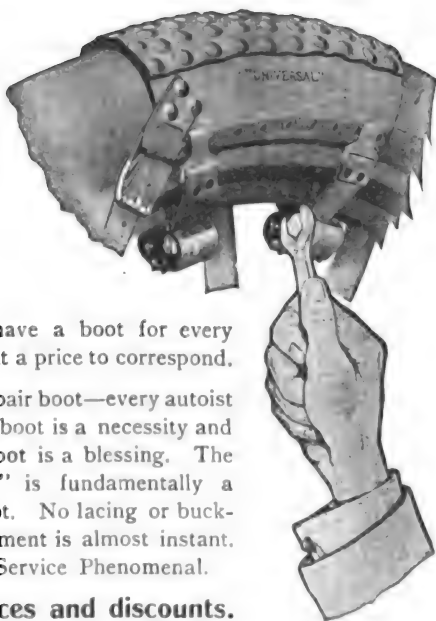
lengths. We have a boot for every emergency and at a price to correspond.

You need a repair boot—every autoist does. A repair boot is a necessity and a quick-repair boot is a blessing. The "UNIVERSAL" is fundamentally a quick-repair boot. No lacing or buckling. Its adjustment is almost instant. Cost Nominal, Service Phenomenal.

Write for prices and discounts.

Universal Tire Protector Co.

Lock Box, 678 D
ANGOLA, INDIANA, U. S. A.



BULLS EYE SPARK PLUG "The Plug with the Crystal Ports"



Shows at a glance dead cylinders and imperfect combustion.

Aside from special features the best made spark plug on the market.

Ports guaranteed against breakage.

Order a set from your dealer or from us. \$1.25 each, charges prepaid on receipt of price.

G. C. BLICKENSDECKER CO.

STAMFORD, CONN.

No radiator troubles when you have Se-Ment-Ol. It's better than a garage full of tools; better than any amount of soldering and tinkering.



SE-MENT-OL
"CHEMICALLY CORRECT"

Simple? Extremely. Just pour it in. Finds the leak and fixes it. Nothing in it to injure metal or rubber. Can't clog pipes or fine passages.

THE NORTHWESTERN CHEMICAL CO.
Marietta, Ohio.

You Can Save Money

by having broken auto parts repaired by us. Our charge is but a fraction of the cost of a new part. The repaired part is as strong and serviceable as when new.

We repair within twenty-four hours after part reaches our shop—broken cylinders, axle housings, crank and transmission cases (both cast iron and aluminum), etc., and practically all metal parts of the machine.

When Your Auto Breaks Down

Get in touch with us. We guarantee every repair we make. If, within one year from date of repair, part is found unsatisfactory, ship it to us (by freight, collect). Money refunded upon inspection of part.

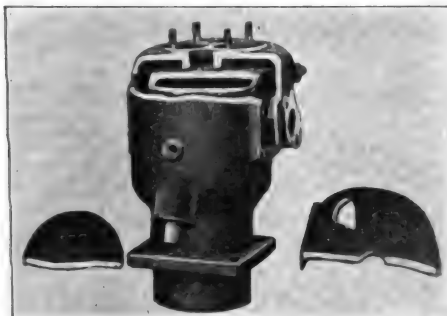


Illustration shows repair made for Axel J. Sjolund, Manchester, Mass. New cylinder costs \$40; our repair charge was \$18.10.

Write for Full Particulars

WATERBURY WELDING CO.

1148 C South Main St.

Waterbury, Conn.

HERE IT IS!

It's just the Screw Plate everyone has been waiting for.

Contents:

- 1 Plate Stock 11" long.
- 1 each, Screw Adjustable Dies 1/4x28, 3/8x24, 1/2x20.
- 1 each, Plug Hand Taps 1/4x28, 3/8x24, 1/2x20.
- 1 each, Spark Plug Taps 1/2" Pipe and 7/8x18 A. L. A. M.
- 1 Adjustable Tap Wrench, No. 1.
- 1 1/2" Cold Chisel.
- 1 Center Punch.

All for \$6.50, Net.

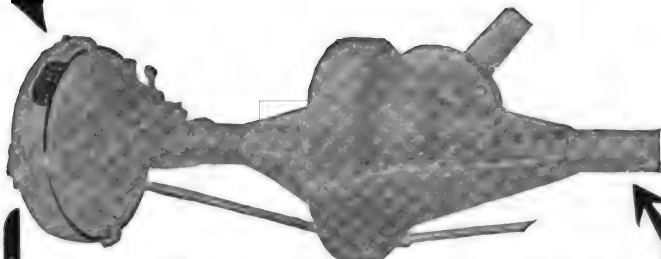
BUTTERFIELD & CO.

Derby Line, Vt. —and— Rock Island, Que.

New York Store: 126 Chambers St.

A CAR IS ONLY AS SAFE AS ITS BRAKE LINING

No matter how costly or well constructed, your car will be hopelessly wrecked and the occupants perhaps seriously injured or killed, if the brake lining fails at a critical time. Accidents reported daily in the newspapers prove this a fact.



J-M NON-BURN BRAKE LINING

never fails. It locks wheels almost instantly, or gradually, as required. It never burns, chars, slips, ravel, or rots out. It wears down slowly, outlasting twelve ordinary linings. It is made of pure asbestos interwoven with strong brass wires, producing maximum braking efficiency with minimum wear and expense. Name on every piece—look for it. Sold by most dealers. Write for Sample and Booklet.

H. W. JOHNS-MANVILLE CO.

Baltimore	Dallas	Milwaukee	Philadelphia
Boston	Detroit	Minneapolis	Pittsburgh
Buffalo	Indianapolis	New York	San Francisco
Chicago	Kansas City	New Orleans	Seattle
Cleveland	Los Angeles	Omaha	St. Louis 1471

Our New No. 8 Adjustable Sectional Vulcanizer With Three Cavities



As a Progressive Business Man you should by all means use, handle or recommend our

New Improved Auto-Tire VULCANIZING MACHINE

simply and solely because it is the best there is in Vulcanizers at any price and because the price isn't much, the operation is easy and profits are exceptionally large.

Our machine is different, far better and more economical in operation and investment cost than any other made. In all features it is so superior to all other devices there is hardly a comparison. We have some facts that will interest you and that will put you in the way of big profits. In your own interest, get posted—Write to us to-day.

Auto-Tire Vulcanizing Co., Lowell, Mass.

TIRES. TUBES. TIRES.

1912 STANDARD MAKES.

FREE SPECIAL OFFER FOR THIS MONTH ONLY.

\$3.00 Button Tire Cover given away with every purchase of tires. These tire covers are guaranteed waterproof and dust-proof and will be furnished in any size.

Highest grade stock, comprising of the best manufacturers. Cannot advertise names on account of the reduced prices we are selling them at.

Every tire is guaranteed brand new, perfect in every respect, and are not more than six months old. Some of these have the names of the makers on and others are buffed.

We thoroughly examine and test every tire and tube under heavy pressure to detect any weakness before shipping.

These are not the kind usually advertised. Nothing but the best stock is quoted in this ad.

Casings to fit Clinchers, Quick Detachable or Dunlop Straight Side Tires.

Size	Casing	Tube	Size	Casing	Tube
28x3	\$9.50	\$2.50	35x4	\$22.00	\$5.25
30x3	10.75	2.75	36x4	19.50	5.40
32x3	10.50	3.00	37x4	22.50	5.75
28x3½	12.00	3.00	32x4½	20.00	5.50
29x3½	14.50	3.15	38x4½	23.00	5.80
30x3½	14.50	3.75	34x4½	23.50	5.75
31x3½	15.00	3.75	35x4½	24.50	6.00
32x3½	15.00	3.90	36x4½	25.00	6.10
34x3½	15.75	4.15	37x4½	25.00	6.20
36x3½	15.00	4.25	34x5	20.00	6.00
30x4	16.50	4.60	35x5	25.50	6.25
31x4	17.00	4.75	36x5	26.00	6.50
32x4	17.50	4.90	37x5	28.00	6.75
33x4	19.00	5.00	37x5½	30.00	7.00
34x4	19.50	5.10			

Take advantage of these prices and free offer, as we cannot guarantee how long these prices will stand good.

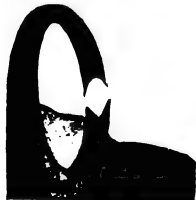
We guarantee these tires and tubes to be strictly 1911 and 1912 goods.

We are one of the oldest and largest tire mail order houses in the United States, and you do not have to hesitate to send us an order with cash accompanied, as we can refer you to any Commercial Agency or Bank in New York, as to our references.

We agree to refund your money if goods are found unsatisfactory upon receipt.

We Ship Goods Subject to Examination.

INSIDE TIRE PROTECTORS.



Prevent blow-outs, punctures, and greatly increase mileage. These tire protectors are made from 3 to 6 ply of Egyptian fabric, with a self-seal flap reinforcing the rim and sides, always the weakest parts. Tube pinches are eliminated by the use of these protectors.

Order a complete set of them and save 100% on your tire expense.

Size	Reg. Price	Cut Price	Size	Reg. Price	Cut Price
28x2½	\$4.65	\$2.40	35x4	\$7.00	\$4.90
28x3	4.75	2.60	36x4	7.75	5.00
30x3	4.90	2.85	32x4½	7.25	5.00
30x3½	5.25	3.85	34x4½	7.50	5.10
32x3½	5.50	3.55	35x4½	7.60	5.25
34x3½	5.75	3.95	36x4½	8.00	5.50
30x4	6.20	3.75	34x5	8.10	5.60
31x4	6.25	4.00	35x5	8.25	5.75
32x4	6.40	4.20	36x5	8.50	6.00
33x4	6.60	4.40	37x5	9.00	6.50
34x4	6.75	4.75	37x5½	9.25	6.75

Owing to the fact that our profits are very small, we sell for cash only, and under no circumstances otherwise.

C. O. D. orders filled if 10% is accompanied with order, to show good faith.

Send for complete list.

EXCELSIOR TIRE CO.,
1777 Broadway, New York City, N. Y.

Monograms



¶ Your's is not a public car.

¶ Get out of the crowd.

¶ Put your monogram on your car. It is the finishing touch of refinement and it will make your car distinctive.

**Monograms
from \$2 up**

¶ The best at the price of the cheapest.

Send for Catalogue E

**THE HICKOK
MFG. CO.**

44 St. Paul Street
Rochester, N. Y.

Packard

CABLE

**IS THE PUBLIC'S CHOICE FOR
Lasting Ignition and Lighting Service**

Why? "Ask any user."

Want new 2-color circular?

THE PACKARD ELECTRIC COMPANY

229 Dana Avenue, Warren, Ohio.

THE NATIONAL STARTER

The first mechanical starter that is actually perfect. Works 100 times out of every 100 trials. No acetylene gas, no compressed air, no electricity, no gasoline, no springs. Write for booklet.

Dealers Wanted Everywhere

Dealers: Wire or write for our special dealers' proposition—the biggest and most profitable thing in the accessory line.

THE NATIONAL GAS ENGINE STARTER COMPANY

Dept. 554C, 30-32 N. Dearborn St., Chicago, U. S. A.

Guide

Electric Headlights Have the Power

On the darkest nights the road lays before you as distinct and clear as under a noonday sun.

And because of their rugged construction Guide Lamps are dependable and they stand the service.

Send for Guide Books No. 1 and No. 2.

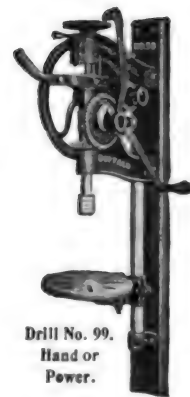
THE GUIDE MOTOR LAMP MFG. CO.
2069 East 4th Street Cleveland, Ohio



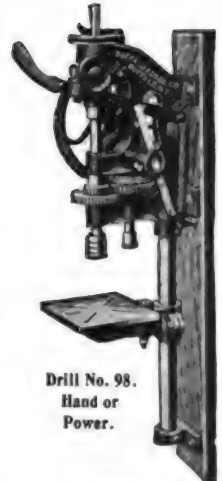
Forge No. 651 E
23x30 inches. Electric
or Hand Blower.



Down Draft Forge
No. 660, Hearth 28x40 in.
Hand or Electric Blower.



Drill No. 99.
Hand or
Power.



Drill No. 98.
Hand or
Power.

**The Forge for your
garage—a clean shop
and a quick weld.**

“Buffalo”

**The Drill Press for your
garage—Ball Bearings;
Automatic and Lever Feed
“Suregrip” Chuck.**

Among the 40 different forges of our make, we recommend No. 660, shown above, for garages, because it is equipped with our patented “Down Draft Hood,” through which smoke and gases are mechanically removed, keeping the shop clean and healthful. It is also fitted with a cinder catcher and with hand or electric blower. It will take the heaviest welds, in the shortest time, with the least effort.

Two styles, very suitable for garages, are shown above. They embody the very latest improved features. Are quiet running, of moderate capacity and very reasonable in price.

Prices and specifications on request. Address Dept. B. T.

Buffalo Forge Co. Buffalo, N.Y.

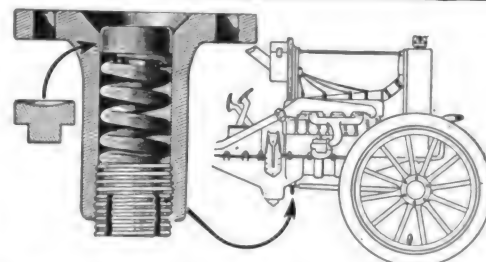
SPLITDORF
MAGNETO

“Always There”

SPLITDORF ELECTRICAL CO.

Walton Ave. and 138th St., NEW YORK

CHICAGO BOSTON LOS ANGELES
DETROIT KANSAS CITY SAN FRANCISCO



Special
for
Model T
Ford
Owners

Does Your Front Axle Radius Rod Rattle?

Send for circular of our New Anti-Rattling Spring Ball Socket, which will prevent this and ensure your axle radius rod against breakage.

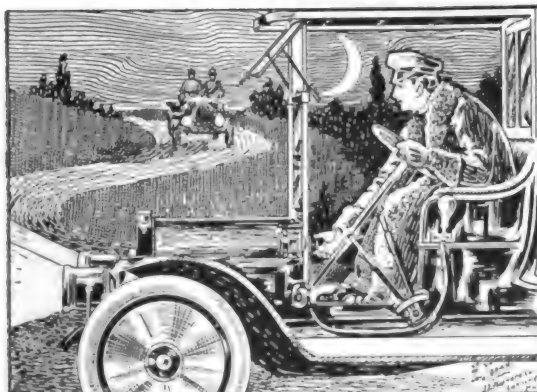
ATLANTIC MACHINE COMPANY

MANUFACTURERS OF VERTICAL TIMER BRACKETS

963 Atlantic Ave.

BROOKLYN, N. Y.

Do Away With the Match Nuisance



Use a
**HAIGHT
LIGHTER**

Your lamps
can be
lighted,
turned down
or out, while
driving.
Regular
equipment
on the
Oldsmobile.

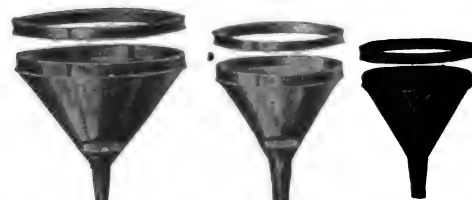
Write for
Booklet.

Made by
**HAIGHT AUTO
LIGHTER CO.**
Lansing, Mich.

DOVER AUTO FUNNELS

ARE THE STANDARD

56 Sizes and Styles

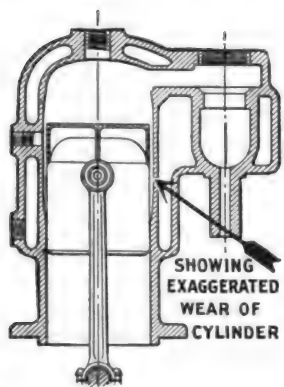


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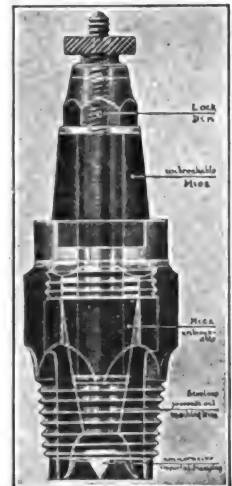
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ELECTRIC VEHICLES.

Their Merits and Their Disadvantages, and Something About the Different Methods of Construction.

BY SIDNEY F. WALKER, M. E.

In the United States electric vehicles seem to be coming to the front rapidly for certain kinds of use, and as is often the case Great Britain, from which this is being written, is rather slowly following. For the last 30 years, inventors in London and in different parts of the kingdom, have been working at the problem, but with a very limited amount of success. Some 30 years ago the engineer to the then leading electric lighting company in London, threw up his situation for the express purpose of working out the electrically driven self-contained vehicle. His electrically driven vehicle has not yet appeared on the market.

In the United States, not only are electric carriages being much and increasingly used for city and suburban riding, but the electric truck is said to be in many ways the best vehicle for commercial uses in most cities. Illustrations of the more popular electric vehicles are given herewith.

Some 13 years ago, the present writer was taken for a delightful spin round the parks of London in an electrically driven four seater, which it was hoped would carry the town by storm, but he believes that the company who were exploiting it is dead. He has heard nothing of it for some years. Three or four years ago the "electro-bus" was put upon London streets, and was apparently all that could be desired. The present writer had a very pleasant journey in one of the vehicles across a principal part of London, late one night, when it might be supposed that if there were any defects, they would have been developed during the day. He carefully watched the manipulation of the vehicle, and apparently everything was satisfactory. The "electro-bus," however, has also disappeared from the London streets for some time.

The only electrically driven vehicle which has survived there is the neat little electrical brougham that is to be seen running through the Park, and often through the city streets. It has survived because what has always appeared to the writer to be the American plan, was followed in connection with these vehicles. What has always struck the writer in connection with new American apparatus that has been put upon the English market has been, the great care with which it was followed up. Every apparatus had a thoroughly skilled man by its side who knew every trick of the apparatus, who was quite ready to enlighten anybody who inquired as to its working, and who was accustomed to coach other men into the method of looking after it. The writer has seen several electrical appliances introduced in the United Kingdom that it would have been perfectly hopeless to have attempted to place if they had been English inventions. They were placed quite easily by Ameri-

cans, and met with striking success afterwards. In the case of the electric broughams referred to above, the vehicle is sold outright to a purchaser, and if required, and it usually is required, the seller undertakes complete charge of the vehicle. For a fixed sum, he provides garage room, he has it kept clean, batteries recharged whenever they want it, the motor and gearing kept in careful working order, and it is at the disposal of the owner at any moment. In practice the matter is arranged thus:

In the case of a city man, the brougham comes to his door at a certain time in the morning, runs him into the city and returns to the house if required to take the ladies of the family shopping. If it is not re-



A Waveley 2-passenger Coupe.

quired at once, the brougham returns to the garage, where the batteries are given a little current while the vehicle is waiting, and the opportunity is taken to have a look at anything that the chauffeur has noticed as being likely to get out of order. If the vehicle is used for shopping in the morning, it returns to the garage when the ladies are deposited for lunch, and comes to wherever they are, on receipt of a telephone message. This goes on for the whole of the working day, right up to the last thing at night. The family are taken to a restaurant to dinner, say, from the restaurant to the theatre, and from the theatre home. Between each journey the vehicle returns to the garage. The main underlying principle of the success of this venture, and it is very successful indeed, is the care with which the whole thing is looked after. Whenever the vehicle is at liberty, it returns to the garage, and batteries and everything else are put in first class form.

Compared With Gasoline Cars.

If one examines the two forms of motor car, the electrically driven and the gasoline driven, one cannot help feeling astonished that the electrically driven vehicle has not made more way; until one goes into

the details of the working of the apparatus, and then one understands. On the one hand, in the case of the gasoline driven vehicle, there is the engine which now has rarely less than four cylinders, each requiring its own spark plug and its own connections to the carburetor, its own lubrication; having its own valves, etc. There is the clutch to give trouble, the gearing to wear, the differential, etc. Above all, there are the two very serious sources of possible failure, the carburetor and the ignition, as well as the serious drawback that the engine cannot reverse, reversal having to be done by wheel gearing, and that until recently, it could not be started from the driver's seat.

On the other hand, with the electrically driven vehicle, there is a battery of accumulators, one or more electric motors, the gearing connecting the motor or motors with the wheels, which can be exceedingly simple; and the controller which manipulates the batteries or the connections of the motor, to give different speeds. The whole apparatus is under complete control from the driver's seat. He can stop or start and vary speed with absolute certainty by the motion of a single lever at his hand. The question of the wear of gearing is reduced to the smallest limits; there is no clutch, no carburetor, no equivalent of electrical ignition. Everything in fact is simplified. And yet while the number of gasoline driven cars of all sizes may be seen everywhere the electrically driven vehicle is not commonly seen.

And the cause is not far to seek. It will be remembered that the electrical ignition apparatus of the gasoline motor outfit is the part which is at fault in case of breakdown, in a very large proportion of cases. The electrically driven vehicle is after all an enlarged electrical ignition outfit; the electric motor driving the wheels of the vehicle, taking the place of the induction coil and sparking plug.

The same difficulties that were pointed out in connection with the electrical accumulator, which forms part of the electric ignition outfit, are occasionally met with in the electrical accumulator that is employed to drive an electrical vehicle. But whereas the electric ignition outfit forms only a small part, though a very troublesome one, of the total output of the gasoline motor car, the electrical accumulator and motor and controller form the whole of the apparatus of the electrically driven vehicle.

In the present writer's article a few months ago, in which he dealt with electrical ignition outfits, he explained the reason why electrical accumulators failed so easily. It will be remembered that he pointed out that the lead grids forming the electrodes of the accumulators, sometimes buckled, so that a positive plate might come into connection with a negative plate, and so put the cell out of service; that the paste with which the electrodes are charged expanded and contracted during charge and discharge, with the result that some of it was often dislodged, and formed connections again between positive and negative plates, again putting the cell out of service. In the electrically driven vehicle, putting a single cell out of service, is not such a serious matter as putting one out of service in the case of an electrical ignition outfit. With the electrical ignition outfit, putting one of the cells out of service, "short circuiting" it, as it is termed, nearly always stops the ignition, and unless there is a duplicate ignition service, the gasoline motor has to stop. With the electrically driven vehicle, putting a single cell out of service merely reduces the pressure delivered to the terminals of the electric motor, while the cell remains out of service, and the

speed therefore, or the hill climbing properties, may be reduced. It would be necessary for several cells to be put out of service for the vehicle to be stopped.

This of course constitutes a great advantage on the side of the accumulator employed for driving an electrical vehicle over that employed for ignition. The electrical accumulator employed for driving a vehicle also, is necessarily very much larger than that employed for ignition, is more open to inspection, and should receive very much greater attention than the accumulator employed for electrical ignition. The ignition accumulator is apt to be pushed out of the way and to get as little attention as can possibly be arranged. The gasoline motor itself requires so much attention usually in other matters; the question of lubricating all the working parts, of seeing that the supply of gasoline and air is correct, that the mixture is correct, takes up so much of the time of the driver, that he rarely wants to be bothered with looking after the electrical accumulator. If the ignition accumulator fails, it is replaced.

Nevertheless, the same troubles which have been



A Waverly Electric Victoria Phaeton.

met with in connection with the electrical ignition accumulator, and which have led to the almost universal adoption of the magneto, were also the cause of the failure of the electrically driven vehicle in the United Kingdom, and to them were largely due its slow progress in this country.

The causes of failure may be stated as unreliability of the accumulator; heavy cost of upkeep owing to the causes mentioned; and in nearly every case, heavy cost of current for charging. In the case of the electric broughams mentioned the seller who looked after the apparatus on the lines mentioned in London, started with one great advantage; they catered only to wealthy men, for whom the undoubted comfort of the electric brougham was worth paying for, and who were prepared to pay a sufficient price to enable the work to be properly done; consequently the undertakers were able to obtain a sufficiently high price to ensure proper looking after, and they were not afraid even of high charges for current.

It should be mentioned also, that in the great majority of cases, those ruling the electricity supply undertakings in the United Kingdom, have not fostered the charging of accumulators. If there were a large number of accumulators coming to the station during the night, when no one wants current, and if

the charging could be carried out entirely during the *off* hours, the supply of current for charging the accumulators should be a great boon. On the one hand there have not been a sufficient number of electrically driven vehicles to warrant the undertakers going out of their way to cultivate them, except in the case mentioned, where the writer believes the sellers of the electrical brougham were able to make very good terms with the electricity supply people; and on the other hand, the electricity supply people on that side of the Atlantic have not been very enterprising in the matter of pushing their wares, the sale of current, except in a very few cases. Complaint after complaint has been made by men who are anxious to have electricity for lighting their houses. The complaint has been, that while if a man went into a new house in almost any town in the United Kingdom, somebody from the gas undertaking was on his track almost before he had time to look round; was ready to put in pipes, if they were not there, to supply and fix fittings, to make connection, and to make everything work as easily and nicely as possible; the electricity supply undertakers were the very opposite. It appears to have been beneath the dignity of most of them, to send round to cultivate new business; and not only that, but when a possible new customer has applied for current, all sorts of difficulties have been put in his way; and when he has got through all of these, he has found that the cost of current has usually been at least twice that of gas. It will easily be understood, that with ideas of this kind ruling the electricity supply undertakings, they did not want to be bothered with the trouble of charging accumulators. As a matter of fact, one of the causes, and it was stated at the time, on each occasion of failure of electrical vehicles, electric cabs and busses that were put on the market, was the high price that was charged for current. In America, as the writer understands it, every superintendent of every electricity station, is out for business wherever he can get it; and hails with enthusiasm, anyone who wants current. The result is, that in England one can almost count the electrical vehicles on his fingers, in America we count them by the thousand, and the electricity undertakings are reaping a good harvest by the supply of current for them.

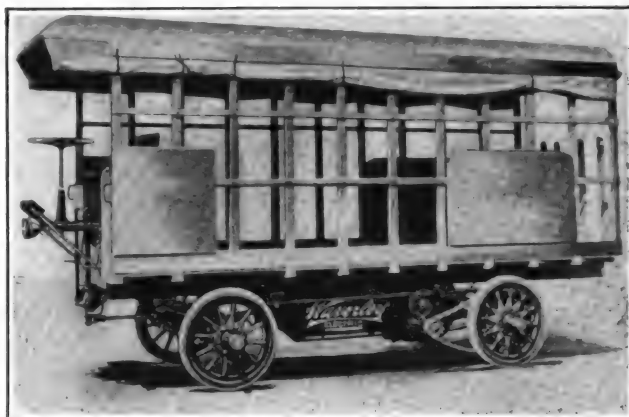
How the Electrical Vehicle is Worked.

As mentioned above, there are only three principal parts to the electrically driven vehicle, omitting of course the chassis, the body of the vehicle, etc.; these are, the battery of accumulators, the motor or motors, and the controller. Wires are of course required to connect the battery with the controller, and with the motor or motors. Up till recently, all the accumulators on the market had some form of lead and lead oxide electrodes; with all the troubles that have been mentioned in connection with them. It has been usual to have a battery of 40 to 44 cells, giving a pressure of 80 to 80 volts, when the cells were fully charged. In this country with which the writer is less familiar than with England, the writer understands that batteries furnishing 110 volts are sometimes employed. The size of the individual cells necessarily depends upon the work the vehicle is required to perform; that is to say, the total weight that is to be hauled, including the accumulator and the motor, and the number of miles over which it is to be drawn.

In the United Kingdom, 35 miles seems to be about the limit of electrically driven vehicles, though one hears every now and then of cases in the United States of a 75 mileage. It will be remembered that while

heavier mileage should be obtained by using a larger accumulator, the larger accumulator itself brings considerably increased additional weight, which has to be hauled, and therefore after a certain size cell is reached, increasing the size does not increase the distance over which the vehicle may be hauled; because of the increased weight.

It should be remembered also, that the contour of the country over which the vehicle has to be drawn, necessarily has an important bearing upon the distance that may be covered. This, the writer believes, accounts for part of the failure of electrically driven vehicles in London. London is full of hills, some of them short, but many of them steep, but they have to be mounted in the course of journeys to and fro, and the power absorbed in drawing a vehicle up a hill, such as are quite common in London, and more common in many of the Provincial towns, is very much greater than that required to draw it along a level road. The power required to draw a vehicle along a level road, has been considerably lessened by the introduction of pneumatic tires; but the use of pneumatic tires will not lessen the power required to draw the vehicle up a hill. In the case of hill climbing, it



A Waverly Electric Two-ton Truck.

is a question of overcoming the force of gravity, and the h.p. required for that is a fixed quantity, that cannot be lessened. In addition, where hill climbing has to be undertaken, weight is rather an advantage, because a certain amount of adhesion of the wheels to the ground is necessary, or the vehicle will not mount the hill. Owners and makers of gasoline driven vehicles of course know this quite well.

The number of cells employed with the electrically driven vehicle is made to fit in with the usual pressure of the charging current. In the United Kingdom a difficulty arises, from the fact that the pressure of the town supply services vary from 200 volts up to 250 volts. When the number of cells was fixed at 40, or thereabouts, the pressures of the supply stations were in the neighborhood of 110 volts. Some years ago, the electricity supply stations throughout the United Kingdom, brought pressure to bear upon the makers of carbon filament incandescent lamps, and induced them to increase the voltage of the lamps from 110 which had previously been the limit, to 200 and upwards. The object of the engineers controlling the town supply services was to enable them to cover a larger area, with the same size distribution cables, and therefore to obtain a larger lighting load. Doubling the pressure of the service quadruples the area over which supply can be delivered, with a given size of cable. With the modern electricity supply station,

in every town, there should be no difficulty whatever in supplying current for vehicle accumulators, at any pressure that may be convenient, by means of what is called a "booster." The "booster" like a good many other things, comes to us in England from America. It is used for a good many purposes. In the present case, it is employed to convert the current from the supply pressure, say 200 to 260 volts, or double those figures in many cases, down to the pressure at which the cells have to be charged. Many electricity generating stations already have booster sets, employed to charge the accumulators which help the station over the times of "peak load," the times when the demand for current is greatest, during the heavy lighting hours in winter; but the booster sets employed in these stations are not arranged to deliver the voltage that would be required for the vehicle accumulator. Hence one of the difficulties that arises when an electrically driven vehicle draws up at some electricity generating station, and wants a supply of current. Special arrangements have to be made to reduce the pressure to that at which the battery is to be charged, and this being out of the usual run of business, is voted more or less of a nuisance. If a resistance is employed to reduce the pressure, half the electricity is wasted. If electrically driven vehicles were turning up every day, at hours when current for other purposes was not wanted, presumably most electricity generating stations would arrange to have a supply convenient.

The Pressure of the Charging Current.

One of the difficulties in connection with the supply of current for charging accumulators is the fact that the pressure has to be considerably higher than that of the accumulator itself. The lead accumulator, which furnishes a pressure of 2 volts per cell when discharging, and when up to its full pressure, requires a charging pressure of something over $2\frac{1}{2}$ volts per cell. The increased pressure is due to the fact that immediately the charging current commences to pass through the cells, oxygen and hydrogen gas are given off at the electrodes of the cells, and the pressure which they bring into the galvanic couple, is added to that due to the lead and lead oxide, of which the cells are formed. The charging current has to overcome the pressure which is immediately set up in the cells that are being charged, and this includes the extra pressure produced by the gases.

In addition to this, a certain pressure has to be provided to overcome the electrical resistance of the cells. The liquid electrolyte in every battery offers a certain resistance to the passage of the current through it. In all batteries, the resistance offered by the electrolyte, reduces the pressure available at the terminals of the cell, and consequently the charging current has to be of sufficient pressure to overcome this resistance, as well as to overcome the pressure of the cells themselves. This is the reason that 40 and 44 cells were arranged as the number employed with electrically driven vehicles; 44 cells when first charged give a working pressure for driving current through the motor, of 88 volts; and they require about 110 volts to drive the necessary charging current through them.

Fall of Pressure During Work.

Another difficulty, though it is not a serious one, that arises with all electrical accumulators, where a certain constant pressure has to be maintained, is the fact that the pressure of each cell commences to fall from the moment charge ceases. At the instant when the charging current is cut off, the pressure of the in-

dividual cells may be as high as 2.6 volts; it drops immediately to 2.2 volts, and very soon after current is commenced to be taken from it, to 2 volts. From 2 volts it falls more or less steadily, according to the rate at which current is taken from it, to 1.8 volts, the limit to which it is thought safe to allow the pressure to fall. Some battery makers prefer to place the limit at 1.85 volts, but 1.8 is the usual figure. 1.85 is certainly safer. It will be seen, however, that where a battery starts with, say 88 volts, if all the cells are put on, it is gradually working down, as the service proceeds. In the early days of the electrical vehicle, this difficulty was met in the same way as it is when accumulators are employed for the lighting of private houses. For lighting, it will be remembered, the pressure must be uniform; and consequently the practice was, to have a few extra cells, which were switched on one after the other, as the main battery worked down. The controller of an electrical driven vehicle in the early days in fact consisted merely of an arrangement



Miss Annette Kellerman entering her electric car. Photo New York. Edison Co

for throwing in a greater or smaller number of cells, as might be required. That method has now been abandoned in most forms of electric cars, and the practice is, to have a sufficient number of cells to allow of the full working pressure at the lowest limit of discharge, and to insert a resistance in the circuit between the accumulators and the motor, to reduce the pressure to that required for the speed at which the vehicle is being run. The objection to the use of additional cells that were switched in as the main battery worked down was, the charging of the extra cells presented some difficulty. The extra cells had naturally not been discharged to anything like the same extent as the main battery; and consequently unless provision was made for only giving them a partial charge, they were likely to be overcharged, before the main battery was anywhere near having received its full charge. With house lighting plants, the difficulty again was got over by the aid of a multiple switch, which enabled the extra cells to be cut out of the charging circuit. In practice the switch was not often used, the extra cells usually received quite as much current as the others, and the trouble often resulted in consequence.

(To be continued.)

DODGING TROUBLE

The Best Way is to Kill it While it is Being Born, or Better Yet, Kill Trouble's Parents.

BY JAMES F. HOBART, M. E.

Some automobile drivers seem never to have any trouble while on the road, while others are "up against it" all the time. I believe the man who dodges trouble best is the man who sees it first, and sees trouble before trouble sees him. And, to come right down to "brass tacks," the man who dodges the most trouble is the one who uses the most common sense in running his machine.

In an endurance run, some time since, a sort of primitive non-stop contest in which the writer was an observer, the blue ribbon could easily have been won had the driver tightened the driving chain before starting on the run. He knew the chain was too loose, but let it go, trusting to luck to win out. That time, trouble saw the loose chain first, and it jumped off twice during a 100-mile run, thereby losing the contest for the owner of the car—just a case of lack of common sense, that's all.

Only the other evening, a terrific racket in the street brought everybody to the front, when an automobile was seen passing at a 20-mile clip without a sign of a tire on either rear wheel! Right over the brick pavement at that speed, while dirt alleys were on either side. Here was a case where trouble put over a "double-header." First, the driver should have never been caught with two bad tires. Second, he should have wandered home quietly over dirt instead of bricks, thereby saving the rims. An automobile can get home for quite a distance upon the rims, without great damage thereto, but not unless a wise head is at the wheel.

There is an old "saw" to the effect that you should "not trouble trouble until trouble troubles you." That makes a mighty pretty line for the kid's copy book, but it won't work worth a continental in automobile driving. If a man doesn't see trouble, go it one better—yes, discount it in fact, then that man had better quit driving anything more complicated than a push-cart or a wheel-barrow!

The exception to the old adage "All things comes to him who waits," was never better exemplified than in the case of the automobile driver who waits awhile instead of making all repairs just before they are needed. That is the keynote of freedom's song in the trouble business! If a man lets a single weak point go unattended to, he is inviting delay or disablement if not disaster. I cannot make this matter too strong for the good of the auto-driver who is afflicted with the "manana" habit, for it will get him sure if he persists in running with known weaknesses in engine, transmission or gear.

A certain car driver invariably had trouble through loss of compression after the car had been running a while, although it ran first-rate while first out of the garage, or after having stood idle a time. The driver submitted that the machine was simply "balky," therefore he humored it as a man would humor a balky horse. A good many car drivers have a similar idea concerning their machines, but it is only the fool excuse of a man who doesn't know and can't find out. Nothing ever "happened" to an automobile, either good or bad. There is a good solid reason—sometimes several reasons—for each and every thing which takes place in or about an automobile engine, and the man who understands these things never says these things

"happen," any more than would say the sun "happened" to rise on the morning of July fourth, or any other day. The man with the balky automobile, instead of hunting out and curing the cause of trouble, would stop and look awhile, then proceed carefully, nursing the lame machine until he got away again. One day the writer got a chance to look over the engine of this machine, the antics of which caused considerable amusement in town. Three causes of the trouble were found possible, each of which might be easily remedied.

The driver in question, was very apt to use far too much gasoline and the machine with its attendant trail of smoke was jokingly known about town as "Smith's comet" on account of the tail of gasoline vapor streaming out behind the machine. Accordingly the writer looked for carbon deposits under the exhaust valve and found them. There is little fear of carbon deposits about the intake valve, as the fresh air keeps that valve pretty clean, but the exhaust valve must

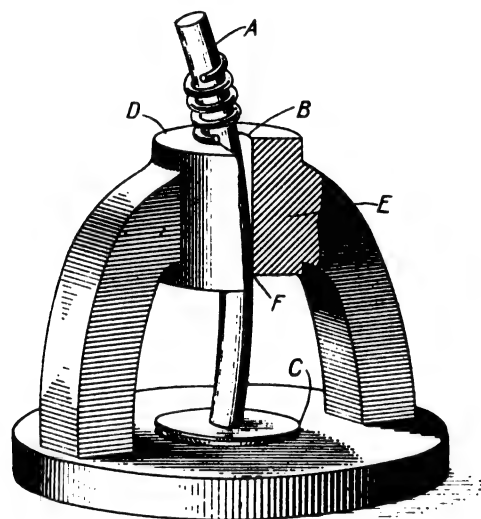


Fig. 1.—Bent valve stem and worn lug.

run exposed to all overdoses of vapor and can hardly avoid becoming foul under certain circumstances.

One valve in particular was found with a stem slightly bent, and whenever a little bit of carbon collected on one certain spot of that valve-face, the valve would be held open a trifle, as the crooked stem became wedged in the lug which served as a bearing for the stem. When the valve happened to be in the opposite position, there was no trouble except a little leakage—much less than when the crooked stem was in just the right (or wrong) place!

Fig. 1, represents the matter, showing the valve diagrammatically, not according to actual method of use. The bend in the stem A, together with the wear in lug at B, is greatly exaggerated. The action of the defective valve, in the instance referred to, seems as follows: When the bend in stem A chanced to be opposite the worn side of lug E, and when at the same time, a bit of soft carbon got caught at C, on the same side as the "elbow" in the stem, then the stem would be caught between three bearing points, B, F, and D, and the friction became so great that the spring was unable to seat the valve and loss of compression took place as a matter of course.

The peculiarity of this trouble seems to be that with a little bunch of soft carbon anywhere else than at C, there would be little trouble caused, as the spring

could force the carbon down flat or squeeze it out of the way. Again, when the valve stem was turned at any other position, except as shown, with the bend at the most worn side of lug E, then the combination could not happen and the engine puffed along with only a slight loss of compression due to the bent stem which kept the valve off its seat most while in the position shown, and least, or none at all, when revolved half-way around. These were the conditions for occasional trouble which did not occur at any particular time, and would go for weeks without being heard from, and again, would bob up hourly for day after day.

Sometimes it's might hard to find the cause of trouble in such cases, but very easy to apply the remedy when once the cause of the trouble is known. In this case, my friend put himself to the bad by permitting a valve with a bent stem to remain in service. He knew the stem was bent a trifle, but didn't regard it as enough to warrant its instant removal, so there is where he didn't dodge trouble as he might have done.

Another cause of trouble in this same engine, developed loss of compression which took place as soon as the engine became very hot, but which did not appear, noticeably at least, when first starting out with the car, but which was very much in evidence as soon as the car was pushed. The cause of this trouble was found to be very simple indeed, and one which every car driver should watch out for. It is shown by the engraving Fig. 2, in which the valve A, is to be lifted from its seat by the arm B, rising underneath the stem C.

When the valve, which was a new one, was fitted to the engine, the stem C, was left a trifle too long and when heated, its expansion proved greater than the expansion of that part of the engine which supported lever B, hence valve A was forced slightly from its seat when the engine became hot, resulting in the loss of compression complained of. Although the lift thus caused was very slight indeed, it was sufficient for a whole lot of compression to leak out, for, as every automobile man knows, compression will leak through a suspicion of a hole almost as well as through an actual opening. Here is another cause of trouble for the wary automobile driver to dodge—and constant vigilance will do it—nothing else will.

A part of the machine which is not as carefully examined as frequently as should be done, is the knuckle which secures the front wheel to its axle. As very little trouble is usual in this portion of the car, it is usually passed over, but recently the writer was eye-witness of a most comical accident which might have resulted fatally, but luckily, did not, and though badly scared, neither occupant of the car was much injured.

While crossing one of The Pennsylvania branch lines—an important part of the "Big Four" road, the bolt holding a wheel to its knuckle, suddenly broke, letting the wheel go free from the axle, except for the steering connections. The car took a sudden circular spin when the axle dropped and hit the track. The machine spun around in a half circle, pitching the driver head-first over, and out of the car, and came quietly to rest in the railroad ditch, the engine of the car chugging along as though nothing had happened. The lady in the car was not thrown out, as she happened to have a good grip on the side of the car at the time, a grip so good that her arm was lame for a week at the wrench it received as the car went around into the ditch.

This unusual and comical accident teaches that the most neglected point which many autoists are guilty of overlooking, is the steering and running gear of the machine. Where the engine is looked after ten times, the steering mechanism is looked after but once, and probably only half looked at, then.

But the third cause of trouble in the friend's car has not been described yet. That trouble was one frequently met with, but which no one need meet if he looks out.

This trouble was dirt in the gasoline. Every once in a while, the pipe leading to the carburetor would be declared "foul" by the gentleman, who would then proceed to tear down the entire gasoline outfit, clean out pipes, tank and carburetor, spending several hours, after "getting hung up" on the road with a clogged-up carburetor, perhaps once in a couple of months or so.

This trouble became so chronic that the writer "laid" for the chance to investigate it and when that chance came it was discovered that the pipes were as clean as the day they were put into the automobile, but still, none of the gasoline in the tank would flow

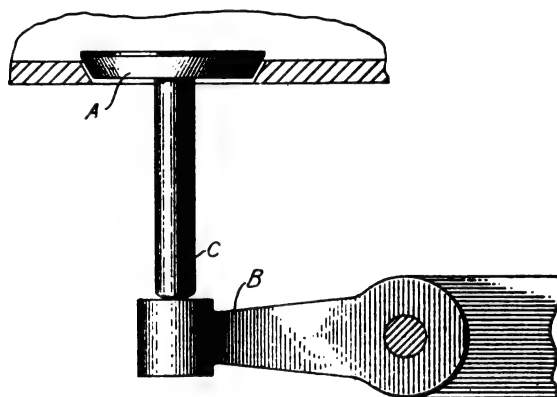


Fig. 2.—Leakage by long valve stem.

into the carburetor. A little sleuthing revealed the fact that Jersey lightning, driven by a Philadelphia lawyer, could never drive a drop of gasoline into the carburetor—and yet the pipes were all clear and clean.

There was a very nice chamois filter in the gasoline conduit between the tank and the carburetor, and that filter was filled so full of dirt that it was utterly impervious to anything less than rifle bullets. The autoist had failed to keep the filter clean, while spending hours in fussing with the pipes. Another case of "penny wise, pound foolish" business. The look upon that man's face, when the filter was shown to him, was worth going miles to see. It's safe to state that he will never get caught that way again and if he lives a couple of hundred years longer, I believe he will become such an expert "trouble-chaser" that trouble will dodge him a mile.

Recently, the writer had a quiet laugh at the antics of a would-be "trouble-hunter" who was looking for lost compression in the columns of the Automobile Dealer and Repairer, but the chap tried about everything else. He had a man crank the engine while he tested the joints around caps, spark plugs and other parts of the engine. He made the tests by squirting oil upon the joints between the suspected parts while watching to see if the oil was sucked in or blown out as the engine was cranked. But the man never thought of using soap-suds instead of oil. Had he made up some very strong suds, using a little glycerine in the water with the soap, then painted the engine with this mixture, any outward loss of compression

would blow millions of the nicest little soap bubbles all along the leakage lines—bubbles which could be seen without half looking—thus giving away any leakage caused by improper setting up of the engine parts. The same treatment with soap-suds may be applied with good results to tires which are suspected of being leaky. The gathering bubbles give the leaks away quickly and unsuspected leaks may often be found in that manner which defy any other method of detection.

But there is one place where the automobile driver should never look for trouble. That place is in the carburetor. If you think there is trouble there, let somebody else hunt it. The car driver can find more trouble to the square inch in an all-right carburetor than can exist in the rest of the automobile. Everything a man without a "license for carburetor repair" should ever do to that important automobile accessory is to admit a little more or a little less gasoline. Draw the line right there, and don't monkey with the carburetor any more than you would with a base-ball umpire—both are on the spot and know their business better than the persons at a distance. If you don't like the working of either the umpire or the carburetor, "put 'em out of the game." You can't monkey with either without getting into a whole lot of trouble.

To be sure, neither carburetors nor umpires are infallible by any means. Umpires don't always see straight, and cork floats will get soggy and heavy after a time, but a new cork insertion had better be made by the man who knows carburetors better than the driver of a car who has only seen three or four at most and who does not know half the tricks of that bit of apparatus.

Only last week the writer saw some trouble finding—not trouble hunting, mind you—in a car which had recently been fitted with one of the new double-opening gasoline connections. That is, the carburetor runs same as any, while the machine is starting up and remains at low speed, but when the machine gets up to about 20 miles an hour or thereabouts, then another gasoline opening is uncovered and a larger supply of gasoline is drawn into the air to make up the increased amount necessary for high speed.

The owner of the car was "adjusting" this double-barreled carburetor and he was having the time of his life. He could not seem to get the new instrument to deliver the right amount of gasoline. The amount persisted in being just too little, or just too much. For many days, the carburetor was adjusted, and last time I saw him, he was still adjusting. He had a big needle with which he would open the auxiliary gasoline orifice a trifle, then run the car a while, then swage open the gasoline hole another quarter of a thousandth of an inch. This would continue until the hole became too large, when he would rivet down the metal around the hole, making it too small again and thereupon the needle-opening business would be resumed.

Beware of monkeying with the carburetor. It doesn't pay to dodge trouble by anticipating it in that appliance. You can make a success at watching for worn bolts, gears and rings, and changing them before they are worn badly enough to cause trouble. That's the way to dodge trouble by watching for it—not by tinkering things—giving a turn here, setting up a little there, just to see what you can do. That is no way to hunt trouble. Then, trouble is hunting you, and it will sure find you too—and stay right with you.

Keep your repair tools in their places and then it will not take more time to find than to use them.

WEAR OF PAINT AND VARNISH.

Means at the Command of the Car Owner to Prolong Their Durability.

BY M. C. HILLOCK.

The car owner finds it to his interests to get the best value possible from the finish on the automobile. It is natural, therefore, that he should acquaint himself with every medium which may in one way or another contribute to the durability of the paint and varnish applied. In the first place it is essential for him to know that there is no small difference between the wearing properties of different colors. Japan ground colors are naturally brittle colors, and, of course, some are more brittle than others. All such colors are in a sense artificially stimulated, and under this treatment they furnish when kept properly protected by ample coats of varnish very good wearing service.

Black and dark greens are accounted the most brittle of all the Japan ground colors, black itself being particularly so, although through the stimulating process referred to it has for years ranked as a durable color, and in the painting of electric vehicles and horse drawn pleasure carriages it is, and is destined to be for years to come, exceedingly popular. Take the case of ivory black for example, as showing the brittle properties or mediums from which it is derived. This black is prepared by carbonizing waste fragments and turnings of ivory. These fragments are exposed to a red heat for some hours in crucibles, great care being exercised to avoid overheating or burning.

By grinding this product in Japan, the brittle quality of the pigment is still further increased, so that it is easy for even the non-technical car owner to understand that without some expert treatment by the painter the color would be rather short lived.

The dark greens used upon automobiles are largely made up from a mixture of black and yellow and therefore carry over much of this same brittle quality. Ultramarine blue, and some of the other beautiful blues, all popular automobile colors, are derived from a mineral or earthen base, and while some of the natural strength and power of these pigments is perhaps destroyed during the process of manufacture the painter, as a rule, is able to so fortify them on the surface as to furnish a very satisfactory service.

Maroon, and not a few of the popular automobile reds, and the beautiful toned lakes, have within them numerous weak and unstable elements, but by a method of preparation and application to the surface, and through the aid of ample varnish protection, they are put upon the surface strong and good and well qualified to satisfy reasonable car owners.

Gray colored cars have proved and are proving popular, and we suspect that there is something beside the color itself that makes the car owner like the various toned grays. Gray is made up from a white lead base the wearing capacity of which goes unquestioned everywhere. Hence the gray color, other things being equal, is practically certain to wear like your grandmother's homespun apron. It is likewise a safe conjecture that any and all of the grays, and creams, and yellows of the paler cast, are surely good wearing pigments if given a fair chance.

In the matter of fortifying the dark, or medium dark, Japan ground colors—giving them a stimulant, in other words—certain rules should be insisted upon whether the car is being home or professionally painted. This stimulant is used in the form of raw linseed oil, the following practice being recommended:

For first coat color over surfaces which carry no preparation coat, either on body or chassis, use one part raw linseed oil to four parts turpentine. All colors, let us understand, to which this adjustment of binder is added should stand over night before being recoated. In the event of being crowded for time use one part raw linseed oil to six parts turpentine. The second coat of color should also contain a binder of oil consisting of one part oil to nine parts turpentine.

Another point in using Japan ground colors which the man who paints his own car, and the man who hires the work done, may alike heed to advantage, namely: Let each coat dry properly before putting another over it. Make every tub stand on its own bottom, to put the issue in another way. So far as possible preserve the purity and the original tone and shade of the color by using a bit of the color in all the rubbing coats of varnish excepting the final one. Be very sure, moreover, that the foundation surface, whether new or old, is alive and endowed with strength. A strong and durable foundation is the bone and sinew of the whole paint fabric when it comes to the final analysis.

Finally, to make the "calling and election" sure for the color, keep it generously protected under wearing coats of finishing varnish. This is the sum of the whole matter, and if well attended to the entire paint and varnish fabric is bound to "make good."

A Nail In a Tire.

A nail which has entered the tread of a tire will not generally penetrate to the inner tube until the wheel has made a number of revolutions. When it does pierce the tube the nail remains in the puncture, so that the tire would not be deflated for hours if the wheel were not in motion.

But with every turn of the wheel the nail as it is brought into contact with the ground moves more or less in its hole and allows a small amount of air to escape. It returns to its original position as soon as carried upward again. The escape of air is hardly noticeable at first, but very soon, because the nail is moved about so repeatedly, the puncture enlarges and the escape of air becomes more apparent. This takes considerable time, and in nine cases out of ten the motorist will not notice that his tire is flat until he has traveled several miles.

Oftentimes this is far enough to do much damage, for when a car is traveling on a deflated tire both tube and envelope are literally chewed between the rim and the ground. When the tire is examined it is found that the walls of the envelope are strained and the canvas torn, while the inner tube, if it be repaired and inflated, will show a thousand almost invisible cuts.

Big Export Automobile Trade.

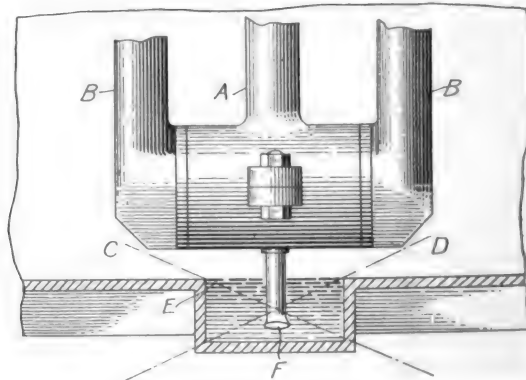
Twenty thousand automobiles was the export record of the United States in the fiscal year which ended June 30, and their value, including parts and accessories, will approximate \$27,000,000. The growth in exports of automobiles has been especially marked during the period since 1905, this growth being coincident with the expansion of the domestic industry, and a corresponding decrease in imports of automobiles. In the period from 1899 to 1904 the value of domestic manufacturers increased about \$25,000,000, from \$5,000,000 in 1899 to \$30,000,000 in 1904, an increase of \$25,000,000; while in the period from 1904 to 1909 the value of the output increased practically \$220,000,000, from \$30,000,000 in 1904 to \$249,000,000 in 1909. Accompanying this notable growth in production, the

imports of automobiles decreased from \$4,250,000 in 1906 and \$4,750,000 in 1907 to approximately \$2,500,000 in 1912.

While France still leads the world in exports of automobiles, the United States surpasses that and all other countries in rapidity of growth of production and exportation.

Splash Lubrication.

Although the amount of lubricating oil should vary and be sufficient for every purpose, the fact remains that there is a great difference between profuse lubrication and an uncontrollable splash. The illustration shows a section of the lower half of a motor case, and a lubricating oil throw of the connecting rod head, showing the scoop on the cap dipping in the lubricating oil. The level that the oil assumes when the automobile is traversing a grade or slipping down a hill is shown by dotted lines. This system might be designated as a controlled splash, but if the lubricating oil rests in the bottom of a pan it will pile up at the low point, excepting when the automobile is traversing a level, hard road, and excesses of the lubrication will be splashed furiously against the walls and up into the piston, and some of



Lower Half of a Crank Case and the Oil Channel.

this excess oil will be sucked by the piston rings during "inspiration," resulting in the unbalancing of the mixture and a troublesome series of incidents, not among the least will be mentioned carbon formations in the combustion chamber on account of the glue-like consistency of the deposit so formed, and the fact that silicon and other earthy dusts which come in with the mixture will be arrested in their migration and will add to the cement-like formation that ordinarily passes current as a carbon deposit. The motor will soon indicate a cranky condition of performance under these circumstances, and far too soon pre-ignition will occur. In the illustration A is the connecting rod, B B the throw of the crank, C and D oil level going down and uphill respectively, and F the scoop.

The Care of Detachable Wheels.

It is now very often found that in modern motor cars it is the practice in order to avoid the trouble which is necessary in changing tires should one become damaged to fit the car with detachable wheels and this in theory affords a very quick and easy method of changing which is much appreciated as long as it works properly. When out on the road with a car that is fitted with detachable wheels it is often found, however, when it is required to change the wheel in the case of a puncture or burst, that it takes nearly as long to get the wheel off the hub as it would do to fit a spare tire. This is due to the fact that the water which is applied to the wheel when

washing the car very often gets into the hub of the wheel and this causes rusting, which is very effective in fixing the wheel firmly on to the hub. Cases have been found where owing to this cause it has required a hammer to remove the so-called detachable wheel from its hub. Obviously this is a very serious defect when a car is used for touring purposes and one which can be prevented entirely or at any rate to a very large extent by due care of the wheels. In order to prevent this occurrence it is advisable to take the wheels off periodically and thoroughly cleanse the hub, so as to remove every particle of rust. When this is done a thin coating of oil and grease should then be applied. At the same time it should be remembered to clean out the inside of the wheel and treat this also in a similar manner with lubricant. It will then be found that the wheel can be slipped on and off the hub without any trouble whatever and wheels so treated will last for about a month of steady running without further treatment.

While upon this point it may be interesting to mention the difficulty which is often experienced in cleaning wire wheels, and for this purpose it is advisable to obtain a proper brush for the purpose; these are sold by most motor car accessory dealers and save a great deal of time.

GARAGE METHODS.

How Checking Systems Protect Car Owners From Swindlers and Loss.

Although there are a dozen methods, more or less, of easy and inexpensive installment, whereby a car cannot be taken out of a public garage unknown to the owner, the simplest and best method is not easy of determining. Locking some part of the car so that the motor cannot be started is simple enough, and so is a lock that will not permit the car to turn. In one garage in this city they have a practical checking system so that when an owner puts a car in he gets a number and a brass check with his number stamped on it. The car is assigned to a regularly allotted station, where it is supposed to stand as long as it is in this garage. By this arrangement confusion is avoided, or nearly so, because the driver knows just where to take it when he is through with it. The man in the office also keeps track of this. A car cannot be taken out of the building until its check has been turned in at the office and it cannot be taken into the garage until the check is got at the office and placed on the machine. In this way the office can keep track of an automobile at all hours during the day and night, and so the checking system has paved the way for still another system which is advantageous to the owner. When the car is checked in or out at the office the time of the day is taken and marked down on a postal, which is mailed to the owner of the car that evening. He is by this means each morning made aware of the movements of his machine the day before and he is enabled to keep tabs on his chauffeur. This, naturally enough, does not appeal very strongly to many of the chauffeurs, for it puts a crimp in their rides, but it has been noted by many of the owners that it effects a considerable reduction in the cost of upkeep.

Another checking scheme that is used and that is about as popular with the chauffeurs as the measles is sending out a card to the owner on which is a list of the various injuries that the car may have received in the course of its day's journeying. Every time that a car is brought into the garage it is carefully gone over by an attendant, who makes a note of

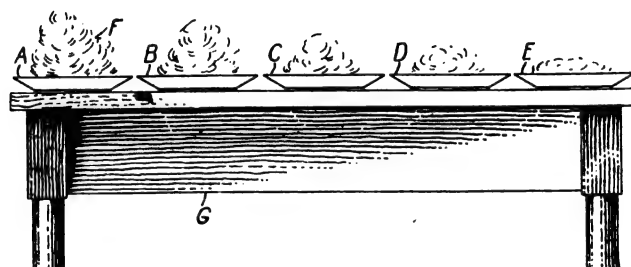
the damages and makes a report to the office. This protects the management of the garage as well as the owner, for it never fails to fix the blame for the injuries where it belongs.

Even the washing of the cars has been reduced to a system. Instead of the old method of having the washers go around from car to car with a bucket of water and a cake of soap of the regulation scrub hard variety the method used is to have the soap broken up and dissolved in large vats. This constitutes a saving on both the soap and the cars, not to mention the labor entailed in putting the soap on with a small cake.

As a matter of fact, little sympathy should be extended to the victims of so-called joy riders when it may be so easily prevented. An employee who will take out the car of his employer without permission lacks a vitally necessary moral quality. Doing this, he is likely to do something worse. It is doubtless incident to a new and rapidly developing industry that there are a whole lot of crooked chauffeurs in the large cities. But conditions are growing better and soon the man who drives a car will have as high a character as the coachman has held for so long.

Testing Gasoline.

If the car owner will go to a wholesale druggist and purchase several samples of the hydro-carbon products, each varying in specific gravity, and spill some of each in dishes as shown in the illustration, he will learn some-



Testing Vaporization.

thing about vaporization. He will find that the product of the lowest specific gravity in the dish A will vaporize quicker than the products of the next higher shown in the dish B, and so on down the line, the heaviest product in the dish E will scarcely volatilize at all. In the illustration, G is the table, and the dishes of hydro-carbon products may be placed as shown. This simple test merely goes to show that a composite mixture of all these distillates if used as automobile gasoline will give trouble in various ways unless the means at hand for its proper use take into account the fact that the lighter fractions will vaporize out of the body of the liquid, leaving the heavy residuum.

Better Solid Tires.

It is now possible for a truck owner to buy tires covered by a guarantee of 10,000 miles, irrespective of the city or locality in which they are to be used. Up to a short time ago manufacturers were compelled to discriminate against certain cities and localities because of local conditions, such as bad pavements, unimproved highways, the prevalence of hills and for other causes peculiar to a particular section. In such places guaranteed mileage was less than where better conditions prevailed.

Demountable solid tires for use on motor trucks likewise have had the effect of generally improving tire service. They have been proved to be entirely

practical and have eliminated the delays and inconvenience resulting from the use of pressure applied tires. As the tire question is regarded as one of the greatest determining factors entering into economic motor truck operation, the general effect upon truck development is apparent.

SMALL CARS AND LARGE.

Some of the Advantages and Disadvantages of Each and the Question of Expense.

A good many who feel unable to own more than one automobile, and that possibly one of medium price, want one that will carry more than two passengers, even though their family consists of but two persons. In purchasing they are unselfish enough to want one that will permit taking in an extra passenger or two, if occasion permits, and thus give others the pleasure of a ride.

This unselfish feeling is commendable. But it is likewise a fact that the heavier and larger the car, the more it seems to the passengers like "riding on air," other things being equal. It keeps in the road better and its weight minimizes shocks. It likewise costs less per mile to run per passenger. But here the favorable comparison ends. In many respects the medium powered two passenger car costs far less for upkeep, to say nothing about the less money invested in the purchase price. The president of the Reo Motor Co. thus expresses a comparison:

"In the first place, the medium-sized car is unquestionably the most economical. There is a saving of from 50 to 80 per cent. in the purchase price, and when I make this assertion I include motor cars varying in price from \$1,000 to \$5,000, which have a seating capacity of five passengers each. This saving of 50 to 80 per cent. practically applies to the replacement of axles, springs, transmissions and other parts, and with slight exceptions, the rule obtains in the consumption of gasoline and lubricants. The rule also applies to storage due to the larger cars taking up more room and requiring more labor to polish and wash them.

"What is true in the saving of the purchase price, in replacements and in storage, is equally true in the vital matter of tires. A complete set of standard 34 inch tires, including tubes, for the Reo the Fifth can be replaced at the current prices for \$120 to \$125. To replace a standard set of tires on a large car would cost between \$350 and \$375. This purchase price is about 300 per cent. greater than that of the Reo. Then it must be considered that the life of a set of tires on the smaller car, mile for mile traveled, is from 50 to 90 per cent. greater than on the larger car. The heavier the car the wider the ration of tire upkeep becomes in favor of the smaller car. All things considered, it is safe to say that the tire expense on a big car is from three to five times greater than on a car of the popular type of Reo the Fifth. It is therefore plain to the practical doctor, contractor, business man and farmer which car will give him the most satisfactory service and save him the most money."

Descending a Hill.

A high grade car should hold itself going down hill on compression, the driver using either high, intermediate, second or low, according to the grade and character of the road, and then regulating the speed by gently touching the emergency brake from time to time. By doing this, the brakes of a car are kept in perfect condition for an emergency, and they neither heat nor wear.



This department is intended as a "trouble clearing house" for car owners, dealers and repairmen. Inquiries in relation to marine motors will likewise be answered, as they are of interest to car owners and others who use the two-stroke cycle engine.

Readers are requested to make criticism and comments or to freely discuss any subject of interest to the automobile industry, and to add information of their own experience in remedying troubles.

Inquirers are asked to give the fullest information in every case so that replies may be made intelligently, and thus be of interest not only to the inquirer but to others.

939

A Knock in the Motor.

From P. E. Muhring, Iowa.—I would like your advice about what to do to take a knock out of a motor which has been tried by all the best repair men in several towns around here, and all have failed. I have a two cylinder Model H. C. Maxwell touring car with their own make of carburetor and a Memy magneto. The compression is good and there is plenty of power, but as soon as I start to go up hill and give more throttle it will pound in the outer ends of both cylinders no matter where the spark is. Have had the motor overhauled this spring and every bearing adjusted tight so there are no loose bearings, and the motor is perfectly clean. I would be very thankful if you would give me some light on the trouble.

Reply.—It looks very much as if the pound were caused by a mixture too rich in gasoline, although as the car is several years old it may be due to the pistons being too loose in the cylinders. It will be an easy matter to reduce the gasoline or increase the amount of auxiliary air to reduce the richness of the gas. You can easily prove or disprove our theory in this respect, but it will be necessary to remove the cylinders and caliper both cylinders and pistons to discover whether or not there is too loose a fit.

940

Ignition Trouble.

From C. P. Hummel, Arkansas.—I have a Model T 1911 Mitchell car and have some trouble with the ignition. I have a Splittorf magneto and same has run all right until last week when it refused to run on the magneto on high. It runs all right on second and low, but as soon as I put in high it skips and soon dies out entirely, and by throwing the switch on batteries it goes right off. I have had it looked into by the mechanic at the garage and he says that the magneto is in perfect condition and that the trouble is in the coil. Please advise what you think is wrong as I do not want to bother the makers for a new coil unless that is the trouble.

Reply.—With your motor in second or low it runs more rapidly than in high. This seems to show that the magneto does not develop sufficient current on high, but does in second or low. The fact that the motor runs satisfactorily on the batteries disproves any trouble with the coil. It is our opinion that either the spark gaps are too wide for magneto ignition, the breaker box is flooded with oil, the contact points are pitted or set too far apart, or that the magnets of the magneto are partially demagnetized. There is a possibility, of course, of a slight leak somewhere in the insulation of the primary circuit.

941

Grating in the Ford Transmission.

From E. W. Miller, Illinois.—I own a Ford roadster

which has been run 2900 miles. When I apply the low speed pedal there is a very decided grating noise in the transmission, either in the low speed drum or in some of the gears. The noise is noticable the minute you apply the pedal and recently when the pedal is shoved nearly home the grating noise is not so severe. When the car is under way on low speed and the pedal pushed home the low speed does not engage continually but spasmodically, this would indicate that the metallic grating noise is only at certain positions or that the transmission does not engage at all a part of the time. We note when the hand lever is at neutral that the reverse drum and service brake drum run in the same direction as the engine, and while the low speed drum between the two has a tendency to start and stop and then when it does move the direction is opposite from the other two drums. With the hand lever in neutral position if we apply the service brake and then release it and apply low speed pedal the grating noise is very severe. We have taken out the transmission and put in a new bushing at the suggestion of the branch factory and have placed a new raybestos band on the low speed drum but without remedy. The grating is of a metallic sound and you would imagine the transmission was being worn out, judging from the noise. We are not sure whether the trouble is the interference of the drums or whether it is in the meshing of the gears. The gears do not appear worn. We have always oiled freely and the car has not been abused.

Reply.—Any such grating noise as you describe is likely to lead to serious trouble without attention at once. We should advise you to take the car to some reputable garage and have the transmission taken down and carefully examined. The brake bands on the drum are apparently slipping and may need relining or adjustment. It is perfectly proper for the reverse drum to travel with the engine on all speeds ahead, at the full engine speed on high. In the reverse the drum should not revolve at all, being held by the reverse band. In like manner the low speed band should prevent the low speed drum from revolving, when the lever is in the low speed position. In high speed the three drums are locked together and should run at engine speed.

942

Carburetor Adjustment.

From C. M. Sabin, Iowa.—I have an American Traveler, a Regal, a Velie, and a Mason to take care of. Will you please explain through your paper how to adjust the carburetor when the mixture is too rich and when it is too weak? It has a popping sound when too weak. What I would like to know is which way to turn the nut for both.

Reply.—As you have neglected to state the make or makes of carburetors of your cars we can only answer in general. To reduce the richness of the mixture there are two methods, one to reduce the tension of the auxiliary air valve spring and the other to partly close the adjusting needle valve. To increase the richness you should do just the opposite. Usually unscrewing will open and screwing from left to right or clockwise (unless one is standing on his head or the screw or bolt is inverted) will close a needle valve and respectively decrease or increase the tension.

943

Who Can Solve This?

From D. A. Jamison, South Dakota.—Please let me know through trouble department why a four cylinder Buick car with Remy type L magneto will not fire or run with four good dry batteries unless the push button is kept vibrating, but when started and switched to the magneto, it runs without a miss, and by using only two

of the same batteries it will start without touching the push button and run all right on the two dry batteries. All the wiring, breaker box and distributor seems to be all right.

Reply.—The condition you describe is a very peculiar one to say the least, and the only reason we can ascribe is that there is some mix-up in the wiring. The New York office of the Remy Electric Company are equally at sea in devising any reason for such action of the battery, saying that the system will operate ordinarily on three cells but four or five are usually employed with Remy Type L magnetos.

944

Missing Explosions.

From T. B. Maness, Missouri.—I sold a customer a 1910 model R, 4 cylinder Reo, which I have since cared for. Lately this car misses or short circuits at the plugs badly, in first one cylinder and then the other. I am using the same plugs and oil as always and the same as on other cars. The same has been cleaned of carbon, the compression is O. K. and when it don't skip, pulls and runs fine. The owner has a habit of cutting off the current and coasting down hills on second speed which I believe causes the trouble, as it seems to me the high speed of the engine will put surplus oil in spark plugs and gaps. The oil used is high grade, but on examining the missing plug I find the oil seems to have a fascination toward filling the gap. This of course indicates too much oil, but why does this oil accumulate between the gaps especially? The oil supply is just as it was in 1910 and 1911. The same oil and everything else the same as far as I can tell. This car went crazy the same way about a year ago but when I cleaned out carbon and put in new plugs it quit until lately. Cleaning carbon did no good this time.

Reply.—From the symptoms described we are inclined to believe that as the short circuiting of the plugs may be in any cylinder, the trouble is caused primarily by faulty ignition. If the ignition is intermittent at any plug, oil and carbon are quite likely to collect at the gap, which in regular ignition is burned off the electrodes. We should advise careful attention to the platinum contact points in the vibrators, if vibrating coils are being used, or in the interrupter if magneto circuit is used. We do not believe that coasting second speed causes the trouble unless the throttle is nearly closed and there is considerable wear in the pistons, rings and cylinders, allowing an excess of oil to be pumped into the combustion chambers. Such a condition should show in the same cylinders always, however. It is not unusual for an excess of oil in the breaker box to cause uneven ignition in magneto circuits.

945

Fire Extinguishers.

From a Reader, South Dakota.—Will you kindly publish a formula for a dry powder that you know will put out gasoline fires? The standard formulas are many but they are no good for gasoline fires. Many cars catch on fire on our prairies miles from water, a shovel to throw dirt with or anything to fight fire with, so most all automobile drivers carry one or more tin fire extinguishers which I know from three experiences will put out gasoline fires instantly out of doors. I have tried many things to find what these were made of but all seem to add only to the gasoline flame.

Reply.—We can scarcely see why our friend wants a dry powder to put out fires if he knows that the regular fire extinguishers answer the purpose. There are scores of manufacturers of fire extinguishers and as they have made no end of experiments they prepare something far

better than the average individual can make. About the best thing we know of to put out gasoline fire is to smother it with a woolen cloth. But as some fires can't be got at to smother in this way, a powder may be made of 60 per cent. of common salt, 60 per cent of sal ammoniac, and 80 per cent of sodium bicarbonate. In any case, an ounce of prevention is far better than pounds of cure. It is a good deal like having ocean steamers crowded with life boats; make them unsinkable—as they undoubtedly can be made—and few lifeboats will be needed. Keep your gasoline away from fire or fire from your gasoline and you will have no need of fire extinguishers. But if you do not consider this method practicable, carry an extinguisher like those you refer to. By the way, probably one of the best fluid fire extinguishers is aqua ammonia without any addition whatever, or just carbonic acid gas suitably confined.

946 **Must Be Looked Over.**

From George D. Landers, New York.—I have a model T Mitchell car, and in starting the engines in the morning or when cool I have to prime them; then they work all right. Do all machines act so? If not, what is the trouble? The spark lever at times gets stuck when up about $\frac{3}{4}$ of an inch when I try to advance the spark. What is the remedy? Have both batteries and magneto. Will watch trouble department for answer.

Reply.—It is nothing unusual and is probably due to the heavy gravity of the gasoline now marketed, although the "fixed" air opening in your carburetor may be of so great an area that there is not sufficient vacuum formed at the spraying nozzle to vaporize the gasoline. Your valve stems or guides may be badly worn, which would show the same effect. Probably some part of your spark advance mechanism is disarranged or bent. The remedy would be to have it looked over by an expert and the trouble corrected.

947 **Convenient But Unnecessary.**

From H. F. Hall, Pennsylvania.—I should like your views as to what back pressure, in the shape of horse power, there is against an engine 4 cylinders, $4\frac{1}{2} \times 4\frac{1}{2}$ through the exhausting through the muffler, and what special advantage there is in the cut-out. The cutting out of the muffler makes the exhaust so noisy that it is offensive. As most chaffeurs seem to delight in using the cut-out constantly, and making all the noise they possibly can, why would not a larger exhaust pipe and a larger muffler eliminate any necessity of having a cut out?

Reply.—In modern up-to-date motorcar motors, except of the two-stroke cycle type, there is comparatively little back pressure. New York City has very properly enacted an ordinance, now in effect, that not only forbids the use of the cut-out, and thus squelches the "car hogs" who make a racket. We do not consider there is any necessity for larger mufflers and larger exhausts. Cut-outs are convenient for testing missed explosives but they should not be operated in the public streets and highways. The technical committee of the Automobile Club of America are on record as reporting that the use of muffler cut-outs on the road are unnecessary.

948 **Some General Principles.**

From G. H. Woodworth, Pennsylvania.—As a general thing is the mixture richer or thinner at high engine speed than at slow? 2—If an engine gives an occasional skip when going down hill with the throttle nearly closed what adjustment to the carburetor is indicated? 3—When an engine runs perfectly at slow and

intermediate speeds but gives an occasional miss at high speeds, what adjustment is indicated? Using a hot air pipe which reduces the opening somewhat makes it worse.

Perhaps these are not very definite questions, but I want to get the general principles.

Reply.—1—As a general rule the mixture is slightly richer at low than high speed. 2—None. Carburetor adjustments should be made on level ground. The skipping may be caused by too rich a mixture as well as too lean, and may also be caused by the admission of burnt gas through the exhaust valves, the exhaust valve springs being insufficiently powerful to keep the valves on their seats. 3—As the hot air pipe reducing the opening makes conditions worse, it would seem to indicate too rich a mixture, that could be remedied by reducing the auxiliary air valve spring tension.

949 **Overheats.**

From R. M. Andreson, Colorado.—I have a Parry roadster (1910) equipped with a Bosch magneto and a Schebler carburetor. It has given me lots of trouble overheating. If driven two or three miles at ten miles an hour it boils over. The carburetor misses if I adjust it for low speed when I throttle it up, and if I adjust it for high speed it misses when I throttle it down. The carburetor is the same one that came with the car, but the magneto is not. Do you think a new model L Schebler would help?

Reply.—Your trouble is due either to a clogged radiator or water jacket, impeded water circulation or the consumption of too much fuel. If the last cause, it is a result of too late spark or improper adjustment of the carburetor. We do not see how replacing the Schebler D carburetor with a Model L would reduce the tendency to overheating the circulating water. Had you used rain water for your radiator you would probably not have had the trouble.

950 **A Good Expense Record.**

From D. W. McFarland, Nebraska.—I would like to give some figures in "Cost of Upkeep" in reply to Mr. E. C. Dickerson in the June number. I bought a model 33 Buick, 22 horse power, June 1, 1911. The first year I drove 2000 miles over ordinary roads—not oiled and few dragged. Several times I was caught out in the rain and the wind but always drove my car back. I had two blow outs of Michelin tires costing \$42.00; cylinder oil, six gallons at 50 cents, \$3.00; gasoline, 100 gallons 15 cents, \$15.00; breakage \$2.50; transmission grease, \$3.00. This makes a total of about $3\frac{1}{4}$ cents per mile or \$65.50 for the year. Now I have learned more about running a car and expect to make it on $2\frac{1}{4}$ cents per mile this year. I can run my car 25 miles on one gallon of gasoline. I never run my car over 35 miles per hour and average about 20 miles. Care should be taken over rough roads, turning corners, and loading the car. Will say the cost of running a car depends upon the driver and the make of the car. These figures are facts. I was told on buying the car that it would run better the second year than the first and find it to be true in my case so far.

951 **A Clicking Sound.**

From Clark Watson, Iowa.—Would like to say to the boys in regard to the truss rods on the rear axles of the Ford cars: The rear spring hangers hang in the brake drum housing, and there is no load or strain on the differential housing to speak of as there is on the side spring cars. As you will note, the springs are clamped

on the axle about 4 or 5 inches from the wheels, and of course there is a great strain on the differential housing.

I have a new 1912 Model T Ford car, and when I stop the engine after a drive there seems to be a click or snapping sound in the exhaust above the manifold somewhere. This click will make this sound about every five minutes apart for a short while till it cools off a little. Now I have the spark all O. K. and the gas the same, and the exhaust pipe above the manifold has never been red-hot yet. What can this sound be? Do some exhaust pipes do this when they cool off? I cannot find anybody that seems to know just what it is. This is not the only car of this kind in this neighborhood. The country is full of them, but none do this.

Reply.—The clicking sound is not unusual in very many makes of cars. It is undoubtedly due to contraction during cooling.

952 The Accelerator.

From Thomas P. Lewis, Massachusetts.—I want to ask my first question for your expert to pass upon. I drive a 1910 Cadillac, demi-tonneau, 4 cylinder. When using the accelerator pedal only, it has power and runs O. K., but when using the accelerator pedal together with the cut-out, which is meant to be used jointly on that year's car, I lose my power and must at once go into second, or stop short. Can you kindly advise me? Spark plugs are clean and do not miss. The cut-out seems to kill it.

Reply.—The accelerator pedal, if opened quickly, is likely to draw into the cylinder a quantity of unvaporized gasoline that accumulates between the cylinders and carburetor, due to imperfect vaporization, in turn caused by too large a "fixed" air opening at the carburetor air intake, or an adjustment that gives too much gasoline at low speed. A mixer placed between the carburetor and inlet manifold should help this condition. A carburetor with a smaller area to the fixed air, or opening the accelerator very slowly seems to us is the only way to overcome the trouble you are experiencing. The heavier gasoline and as a result harder to vaporize, is a contributory cause.

953 Don't Make; Buy.

From F. R. Tomlinson, Kansas.—I wish to ask how I can successfully make wet batteries for my Olds' 3-horse power, 4-cycle jump spark engine. I have my cooling tank under ground and the pump runs from the line shaft.

Reply.—You can buy wet batteries for this purpose; either of the sal ammoniac or alkaline type cheaper than you can make them. You can also use dry batteries.

954 Magneto Trouble.

From C. E. Youmans, New York.—I have a model 10 Buick car. Last season it ran fine up to some time in January when I laid it up for winter. This season it misses on the magneto when I throw in high and before the car gets up to a fast speed. If I go to climb a hill it will miss fire but when I turn to batteries it will hit all four. I took it to a garage and the man cleaned up the platinum points, etc., of the magneto, and after spending a lot of time it was no better, and with all his adjusting of the carburetor he could not stop the skip or get any power out of the car, and the engine heats badly. Another garage man adjusted the carburetor and it seemed to stop the trouble for a while. Then one day a valve broke and on hearing something wrong I stopped and had the car towed home and replaced the valve and that is the only thing I found wrong. I tight-

ened up the crank bearings a little but not tight enough so but what the car cranked easy.

The engine seems to run fine but heats badly. The carburetor is out of adjustment. Sometimes it will run without heating badly, which makes me think it is carburetor adjustment that is responsible for heating. I cannot get any power from the car. It runs fast enough on level but has no power to climb hills. It skips badly on the magneto now but scarcely ever bothers on the batteries.

I have flushed out the radiator often. Sometimes when I start the car the engine seems to get hot faster than the water in the radiator, which made me think there was a stoppage in circulation of water, but I took off the water pump and drained the water out and it seems to be all right as far as I can see. The water in the radiator was rusty looking.

After putting everything in order again I ran the car but it heats as bad as ever, and I have the carburetor adjustment trouble and the miss fire on the magneto. Can you tell me the best way out of my trouble? It is a Remy magneto and Schebler carburetor. I am losing all the pleasure of my car. Would the wrong mixture of fuel heat the engine and the water to a boiling point? Is there any systematic way to adjust the carburetor?

Reply.—As the distributor of your Remy magneto distributes your battery current when using battery ignition, it conclusively proves the trouble to be in your magneto; either the magnets are partially demagnetized from battery current passing through them, the bearings are "flooded" with oil, the condenser or windings are broken down or there is a broken or leaky insulation somewhere. Your remedy would be to send the magneto to the nearest Remy service station. If your engine does not skip on the batteries, why should you attempt to correct that which is evidently magneto trouble by carburetor adjustment? Your batteries should only be used to start the motor. It is more than likely that running continually on the batteries is the cause of the motor heating, particularly if the battery current timing is too late. If too much gasoline is used, or the throttle is opened more than necessary, you must expect an overheated motor. The systematic method of carburetor adjustment is to adjust for slow speed entirely by the needle valve, and for high speed solely by means of the auxiliary air valve spring tension, remembering that the auxiliary air valve should never leave its seat at slow speed, and that at high speed its mission is to admit air to reduce what would otherwise be too rich a mixture. Do not, as several hundred thousands of others have done, try to adjust your carburetor by guess or rule o' thumb no matter what advice is given you. It is not an unusual incident to hear novices declare that they can adjust carburetors better than the inventors, and in their own way, too.

955 Needs a Different Carburetor.

From E. C. H., Massachusetts.—I am going to take advantage of your invitation to ask questions by asking a few about a Pope-Toledo that I bought over a year ago to do some light trucking with. This car is a model L 1904, and is in good condition, the four cylinders are $4\frac{1}{4}$ bore by 6 inch stroke and all have 60 lbs. compression. The inlet valves are automatic and both they and the outlet valves have been carefully ground in and the stems are straight and not worn. I have the Perfex system of ignition and use a storage battery and Monarch timer. The carburetor is a Schebler L, size $1\frac{1}{4}$ inch. When I open up my throttle lever I get only a slow pickup in speed unless running on the level, and on

a very moderate hill I have to go into second, when I get sufficient power. I use too much gasoline but if the quantity is cut down I get no power at all. Different days, temperature and moisture seem to greatly affect the running, and the cylinders are very sensitive to carbonization. This latter is uneven, it not always being the same cylinder. My ignition is O. K. at all times. Now what I want to know is this: Do you think my carburetor is too large and that I would get a more even mixture with a 1 inch Stromberg. My trouble is right at that point, uneven mixtures at various throttle openings. Perhaps I should also say that my manifold is tight and this carburetor is hot water heated and does not seem to do as well as a Schebler Model D, which I replaced, but which acted in exactly the same way. My exhaust valves open at two-thirds of the power stroke and remain open until one quarter inch from top of following top piston position. Now do not say that I should adjust the carburetor, I have driven cars and made all the repairs for years and this is the first car that I have been unable to fix permanently. Not only have I made all adjustments on both carburetors a thousand times but so also have others well qualified, and indeed the agents of this carburetor in Boston. The result is always the same—no power on hills, choking and hesitation from too rich mixture or else knocking from too much air; never a middle course except the throttle is kept nearly closed and opened with the greatest care and then not over a one-quarter opening.

I trust I have given you sufficient data to answer the question I have asked above as I feel that the whole matter hinges right there.

Reply.—We have no doubt but that a carburetor of smaller capacity, one through which there would be a higher velocity of the air, and in which the "fixed" air opening area would be less, such as a 1 inch Schebler Model L, or any standard make, would give you an explosive mixture with the gasoline better vaporized and more evenly proportioned and better mixed with the air. You should bear well in mind that a motor, designed eight or nine years ago is quite likely not to have refinement of design and perfection in machining that more modern models possess, and that for light trucking operations you are quite likely not to run the engine at so high speed as you would were it used for pleasure purposes. We do not believe it necessary to use hot water for heating the carburetor of this motor during the hot weather. Disconnecting the water sometimes works wonders when the temperature is in the 90's. We think you have located the trouble, but simply because we cannot favor one carburetor without a liability of injuring some other one, cannot advise as to what make of carburetor would be best for your car.

956 **Transmission Trouble.**

From Dr. H. J. Fox, Michigan.—I have a model T Ford car and just lately the transmission has been acting rather strangely. If my car is standing and I give it the clutch to move off, there is a jerking, grinding action. This action doesn't start as the car starts, but perhaps three or four seconds after, or after the car has gone about five feet. It only lasts a couple of seconds but is violent while it lasts. I have tried both loosening and tightening the clutch that is, by that bolt running from the foot pedal through the clutch band, but it does no good. My reverse and brake also takes hold very savagely, no matter how carefully I press the pedal. If my car is running along on high I can throw it into low and run without any jerking. The jerking only happens as the car begins to get under motion in low, and when it

is over I can continue in low and then come back into high and move off as nicely as you please. If you could give me some light on this I would be very grateful.

Reply.—The friction bands probably need relining, as they slip and do not have proper frictional surfaces to take up the load slowly and easily. It is also quite likely that you have had to adjust them to so high a point that the band not in use drags, one working against the other.

957 **Radiator Cleaning.**

From A. P. Pearson, Massachusetts.—I am using rain water in my radiator and find it much better than the city water and will cool better and last longer. My radiator is greasy and needs cleaning out. Can you tell me what is the best thing to do it?

Reply.—Very many of the radiator troubles could be prevented if owners of cars would insist upon the use of rain water exclusively. A little washing soda, say one half pound to a pail of hot water, should remove all grease. The soda solution should be washed out with hot water.

958 **Current Does Not "Catch On."**

From M. A. Cloud, Vermont.—I would like to ask the reason why when shutting off the current in ascending a hill it does not always catch on again when turned back on the magneto as it always used to do? Now we frequently have to get out and crank it. It is a Maxwell runabout with Splitdorf ignition.

Reply.—Your query should probably be "descending" instead of "ascending." Your magneto magnets may be partially demagnetized, spark plug gaps may be too wide, or the clutch may slip and not turn the motor sufficiently fast to generate a current of sufficient strength.

959 **May Be Too Much Gasoline.**

From H. S. Stackbout, Pennsylvania.—I own a Model T Ford, 1911, car, which has been run about 3000 miles. It has been to a garage and the cylinder heads cleaned, valves ground, one piston had three new rings put on, and another one ring. It had a Kingston carburetor which was replaced by a 1912 Holly. When using since getting it repaired, the car heats and repeatedly the water boils in the radiator when run only a few miles. The carburetor mixture is adjusted properly. Would like to know how to remedy this.

Reply.—We think your carburetor is adjusted to get too much gasoline, generating more heat than would ordinarily be developed with less gasoline, a more perfect mixture. You may not be advancing the spark as much as you ought, the water circulation may be impeded or pressure may be leaking past your new piston rings, either of which would cause overheating of the circulating water.

960 **No Other Way.**

From R. B., Peters, North Carolina.—We write to say that we have been working on a Buick model 27 for three days to put in a shift yoke for the intermediate gear, we found it necessary to jack the car up, disconnect the universal joint from the transmission and take the transmission and clutch entirely out of the main frame; the same had to be disconnected from the engine. Then it was necessary to take the transmission loose from the clutch, and after we did this we had to take both axles down in the transmission, and the driving shaft also before we could ever get the yoke in place. Now is there any way that you can advise us to have saved all this work?

Reply.—There is no other way. In assembling the

shift yokes are about the first parts put in place, so in disassembling they would be about the last to be removed, necessitating even the removal of the entire rear axle.

961 **Thinks It Is Out of Balance.**

From R. E. Whitmore, Ohio.—I own a Model R, Reo 30, five-passenger car, built in 1910, which has always given me trouble. The engine appears somewhat out of balance. It appears to be timed right, as I have gone over this very closely, and it has good and equal compression. Neither the rings nor valves leak at all. It is equipped with a National coil and magneto. Everything appears to be in elegant condition about the motor, but on a heavy pull it appears as though one cylinder was getting a backward shot, and according to the way it is, or appears to be, timed, I don't see how it can. If I kick the spark off going down hill and leave the clutch engaged it appears to have about the same quivering and out of balance motion as if pulling. It appears worse when the car is running 10 to 15 miles per hour. Other Reo's of the same model appear to run much easier and smoother than mine. She kicks badly on a pull if the spark is advanced half way unless she is going 25 or 30 miles per hour, and when the spark is retarded she does not ignite until it comes flush to the center. It is equipped with a Stromberg carburetor. I have tried different carburetors, different coils, different magnetos, different plugs, cleaned the carbon out of the cylinders and put in a set of new cylinders and none of these has ever changed the unpleasant vibration of the engine. Have rewired it also. Your opinion on this trouble would be greatly appreciated.

Reply.—The fact that there is a quivering action when coasting would rather seem as if the crank or drive shaft were either bent or out of alignment with each other. If bent and then also out of alignment there would be a slight slip of the clutch during a part of each complete revolution, and it would also be more likely to show on 10 or 15 miles per hour than on high speed. If your motor is out of balance, on running idle at 1,000 r. p. m. you could notice excessive vibration. We do not believe there is any misbalance. It is nothing strange for any motor to kick badly if the spark is too much advanced, and the higher the engine speed of course the more advance to the spark is allowable. The rule is to advance all you can without causing "kicking." By a new set of "cylinders" you probably mean pistons. You should see that your valve stems are free in their guides and that the valve springs are not "set," or too weak. Either of these two conditions will give trouble.

962 **A Bad Grinding Noise.**

From C. H. Rose, Washington.—I have a 1910 Velie and the drive gear in the rear axle is making a very bad grinding noise. I have separated the gears so they do not mesh quite as close and it is not quite as bad but still the noise is there. Everything is well packed with grease and the bearings in the drive shaft are tight. When I go down a long hill and turn off the ignition and let it run against the compression it has the regular hum that it should have but when driving ahead it does the grinding. Is it possible that they are out of line and do not mesh at the right angle? If I set these gears close together they sound much worse and I have found some small pieces have chipped off the teeth.

Reply.—It is quite evident from your description of symptoms that the bushing next to the driving

pinion is badly worn, and that when driving from the motor the two gears are considerably off their pitch line, the wear of the bushing being, of course, opposite to the side where the pressure is exerted on the face of the teeth. There is practically no wear on the opposite side of the bushing consequently when coasting the thrust is on the side where there is no wear and the gears running on their pitch line do not "talk" to you. It would be safest to have the entire differential overhauled and the driving shaft and gear lined up carefully with the differential shafts and the driven gear. It may be that you have allowed matters to go so long that it means an entire new differential gear.

963 **Has No Power on Low.**

From J. I. Eversole, Kansas.—I would like to ask a few questions about my Hupmobile. It is a 20 h.p. and it is in the same fix as Mr. Austin's of California. It simply has no power on low. Now could I put on a timer and distributing box or coil? As the Hupmobile has no way to advance the spark you have no control over it at all. They use a Bosch high tension magneto. I do not think there is any thing wrong with the way the carburetor is set or the timing, as I bought the car new and it did not have the power on the start. They simply have not the power. There is another Hupp here in the town, and it is the way; no power, and all the Hupps I have ever seen have the same disease. But if there were a way to attach a timer and coil I think Mr. Austin and I might be able to get our cars in shape. Would a larger fly wheel give any more power? What horsepower is an engine that has cylinders $3\frac{1}{4} \times 3\frac{3}{8}$, 4 cylinder?

Reply.—We think you would get more power out of your motor if you had some means of advancing or retarding the timing of your ignition. Very fortunately for car users, few models have "fixed" timing. We think you can have your magneto easily changed so that you can advance or retard the time of ignition, much more easily and cheaply than by installing a timer, distributor, coil, etc. If you will address the Bosch Magneto Company, 223 W. 46th street, New York, they will give you full information. The engine should deliver 20 h.p. at 1500 r. p. m. The Hupmobile is rated at 16.9 h.p. Heavier fly wheel would probably not help any except at low engine speed. When in good condition the Hupmobile runabout is snappy and delivers its rated power. Although it will not take steep grades on high it will travel fast enough for any reasonable mortal and is unusually economical with fuel. In many cases the unsatisfactory working of automobiles is due more to the fault of the caretaker or driver than to the car itself.

964 **A Peculiar Popping.**

From Ralph Bostwick, Ohio.—I have a peculiar popping noise in my motor, a Model 26, 1911 Buick. It sounds like a valve sticking, but it is not, as I have had them out and ground them and adjusted the pushrods several times, and it is still there. I also had the cylinders off, and cleaned out all carbon, and there were no broken piston rings. The carburetor is a Schebler Model D, and has been adjusted several times also. The platinum points on the magneto (Splitdorf Model F) have been adjusted and the crank bearings have been taken up, so I don't know what it could be, unless it would be the gas which did not explode in the cylinders exploding after entering the exhaust pipe, as there will be three or four

puffs out of the exhaust pipe at the back end of the car, and then one or two partial vacuum puffs drawing the air into the muffler from this end. It does not make this noise noticeably only when going at slow speed and up to about twenty or twenty-five miles per hour, and when the engine is running idle down a hill. It has been acting this way all the spring. Any information you could give me would be very much appreciated.

Reply.—The popping may be caused by missed explosions, weak exhaust valve springs or valve stems sticking slightly in their guides. If caused by the missing we should ascribe it to the Schebler Model D carburetor, which is not so well suited to the present heavy gasoline as their later Model L. Sometimes the spark gaps can be shortened slightly and, particularly when using magneto ignition, this will prevent missing. The drawing of air into the muffler is an indication of a sticking exhaust valve stem. A little kerosene and graphite will sometimes prevent this but it will be necessary to locate the troubling valve stem and may be necessary to file it slightly.

965 Fixed Spark Trouble.

From J. W. Harbaugh, Indiana.—Please publish in your journal for discussion or answer yourself, what is the cause and remedy for a knock in the engine of a Metz 22 roadster when pulling a hill heavily loaded? It runs on a high tension Bosch magneto with fixed spark. The noise is evidently a cylinder knock. The water in the radiator boils also after a few miles run.

Reply.—The usual cause for knocks in a motor with fixed timing is pre-ignition when the load shows the motor to such a point that the ignition occurs too early. The only practical method of correcting this condition is to send the magneto to the factory and have it changed over to variable timing, which will cost but two or three dollars. Of course you will need to adjust the timing and unless you run the engine always at the same ignition it will necessitate a spark advance lever and connections. Fixed timing is now rarely installed except on taxicabs. For use in hilly places it is manifestly a disadvantage to any car.

966 Starting and Certain Other Matters.

From Frank Quante, Nebraska.—I have a Model T Ford car, 1910, which I have trouble to start, especially in cold weather. Also I have trouble with water boiling in the radiator. Sometimes in running only five or six miles I must stop and let the engine cool. Have cleaned the engine and muffler which helped some. I keep the spark in advance of the gas throttle while running. I do not fill oil above the top pet cock under the engine. I have tried all the experiments suggested in your paper for starting the car also for heating the engine. I had a repair man look at the car. He said that it was all right, that it just used a little too much gasoline. The engine starts all right when warm, but not if it stands all night even in the summer. This is the plan I use to start it: I first pump gasoline in the carburetor, turn on spark and gasoline a little, turn the carburetor which is in the dash one-half turn to the left. Shut off intake and then crank it up. Sometimes it will start in two or three turns, and again it takes a good many. Is the carbon remover which is on the market injurious to use in taking the carbon out of the engine by removing spark plug and inserting and then starting the engine? Would it help to prevent heat-

ing the engine to have a shut-off in the exhaust pipe so it would not need to go through the muffler? The car has run about 4500 miles. I have not used car much in winter on account of being hard to start. I use the same method as in summer except I use about 2 gallons of warm water in the radiator, and after the engine starts I fill with fresh well water.

Reply.—You will have much better results if you will use combined priming cups and plugs, several types of which are now on the market. A few drops of high test gasoline injected into each cylinder should make starting very much easier. Heating may be caused by impeded water circulation (lime or other deposits in the radiator) too much gasoline in the mixture or too late a spark. Your description of the method you use in starting is rather hazy. We do not quite understand how you "turn on the spark and gasoline a little" and "turn the carburetor which is in the dash one-half turn to the left." It is probable that you close the switch and advance the timing slightly, partly open the throttle and then open the gasoline needle valve in the carburetor one-half turn using the extension which leads to the valve. If you would disconnect this extension and conveniently lose it, then make your carburetor adjustment for high and low speeds, using the carburetor needle valve for the purpose, and then leave it entirely alone, much of your trouble would be at once overcome. We do not believe the moderate use of carbon removers on the market to be injurious if used according to instructions. By a "shut-off" in the exhaust you probably mean "cut-out." It would not prevent the motor from overheating. If car owners would forget that they can use well water when filling radiators, and use rain water instead it would very often save the cost of new radiators. From the use of hard water more trouble results than car owners and manufacturers realize. It increases the business of radiator concerns, however.

967 His Front Cylinder.

From J. G. Baker, Illinois.—I have a Model 46 Overland roadster, 1911, which has given me no end of trouble with the front cylinder. The car ran well after the Model D was replaced by a Model L Schebler carburetor for about 1,200 miles when the front cylinder began its misbehavior which has lasted ever since. The cylinder began to miss and was found to be drowned in oil. There was oil and oil which had burned and formed a great deal of carbon and the valve was not seating. After the cylinder and valves were cleaned the car ran well again but has had to have the same treatment about once in every 400 miles ever since. Have done every thing that any one suggested but have had no results. I cut the oil entirely off from the pump but it still had too much. Had the front end of the car raised until it was as high, if not higher, than the other end of the car. Had the cylinder taken off and the rings inspected but they were reported all right. Have changed the oil two or three times but the trouble keeps up. Now this is not a little too much oil but it is lots too much. The compression is good when the valves are freshly ground and the other cylinders have never given me a minute's trouble. Fires perfectly until the valve gets dirty.

Reply.—Missing may result from too much oil in the cylinder and on the other hand too much oil may result from the missed explosions. When the front cylinder is the one giving trouble it is usual to look

to the timing gear case. Too much oil here will cause excessive lubrication of the front cylinder. As this model car has the first two cylinders supplied with the same level of oil it is surprising that the second cylinder does not show the same symptoms as the forward, which inclines us to the belief that the excess of oil is due to faulty ignition. We are led to this belief from the fact that there cannot be any accumulation of oil in the timing gear case in this model. There are two pet cocks in the crank case to regulate the level of oil, and by opening the forward one slightly you may be able to lower the level. If the ignition is faulty, however, and you reduce the lubrication too much you may experience serious lubrication troubles.

968 **Cylinders Misfire.**

From Reader, Washington.—I own a Maryland touring car of 1908 model, said to be a high grade machine. I have a great deal of trouble with cylinders misfiring. I use what is called Monogram oil. The best gasoline I can get only tests 64 or 65. I have tried several kinds of spark plugs. My spark plugs are cleaned before every trip, but they soot and oil up in a very short time after being used. I think they become foul, which is partially the cause of the misfiring. The machine will run five or ten miles sometimes before missing but then it becomes a nuisance. I am inclined to think oil gets past the cylinder rings on the spark plugs. There is no magneto on my machine. Several automobile doctors and repair men have failed to help me. I will appreciate your advice or suggestion.

Reply.—A Maryland car of 1908 is today practically obsolete and forgotten. We have no means of securing authentic information concerning its lubrication, but can say in general that such symptoms as you describe point to a worn condition of cylinders, pistons and rings that could only be remedied by reboring or regrinding cylinders and fitting new pistons and rings. You are lucky to get gasoline of 64 or 65 degree test. There is a considerable amount on the market testing considerably lower than that.

969 **A Rumbling Transmission.**

From F. L. Hayden, Massachusetts.—Please suggest in your next issue remedy for rumbling transmission gear on Cadillac "30" touring car, 1909. This rumbling occurs with the high speed. Of course I expect more or less of it with the intermediate and low speed. The gears are not worn. I have tried Dixon's Cedar Sawdust-Graphite Lubricant which is recommended for this trouble but it does not remedy it. Your suggestion will be appreciated.

Reply.—The only remedy we can suggest is to replace worn bushings, straighten shafts or renew the gears which may not have been perfect when new. A prolific cause of rumbling in gears is when they are not running on their pitch line, or are running out of true. You should remember that the car is not a new one.

He Surely Has a "Grouch."

From J. L. Williamson, Wisconsin.—Today I am a regular "Willie Grouch." I have used a popular make of car for the past five years, and like the car better than any other on the market, irrespective of price, but I ask how long we are going to use a car that has a filthy, dirty rear axle wheel end, when a small hole tapped through the housing would stop it?

What reason has a factory for turning out more than 60,000 machines, and not doing that little thing for us? Not till 1912 did they put on a taper axle. Look at any 1910 or 1911 model rear right wheel and see it wobble. Take off the wheel, and I'll treat if the pin does not fall in three pieces. That is the reason of the chattering when high is thrown in.

I have friends who never see a spark plug out of their engine—don't know how they look. I have tried more than ten kinds. I must clean my first or second plug every day or two—sometimes every few hours.

How can splash lubrication be a perfect one, when the level of oil is constantly changing? If it is right in the morning, how can it be right at night? If not right at night, how was it at noon?

Keep these things stirred up. We pay our money and work in the grease and dirt, because of these things. It will not always be so.

Reply.—Although our friend is just a bit severe, this is somewhat mitigated by his prefatory acknowledgement. Sometimes we critics forget that car manufacturers have a far more vital reason for turning out automobiles that will give no trouble with ordinary usage, than car owners can possibly have, and this reason is intensified when such trouble may be avoided at a trifling expense. It is claimed, and with reason, that if the lubricant and the lubrication are correct and well looked after, the hole in the rear housing is not needed. As to splash lubrication, it is not perfect at all speeds, for all lubricants, and under all conditions, and we know of no system that is, but it is the one adopted by many of the highest priced cars that are made. In relation to the frequent fouling of the spark plugs, this is usually due to the improper handling of the fuel or cylinder oil or both. The fact that 60,000 cars of one model are sold in a single season is not absolute proof that it is a mighty good one, but it is the most conclusive evidence of it that can be had.

For Missing When Throttled.

From G. B. Prime, Florida.—I see several complaints in your paper about the Ford car missing and running irregularly when throttled down. I have had the same trouble several times and have found after considerable trouble that it was caused by sediment and small quantities of water in the gasoline. I found that by opening the throttle and then turning on the needle valve as far as the engine would possibly stand and running thus for a couple of minutes, then regulating the needle valve to normal adjustment, all trouble would disappear and the engine run for several months without further adjustment.

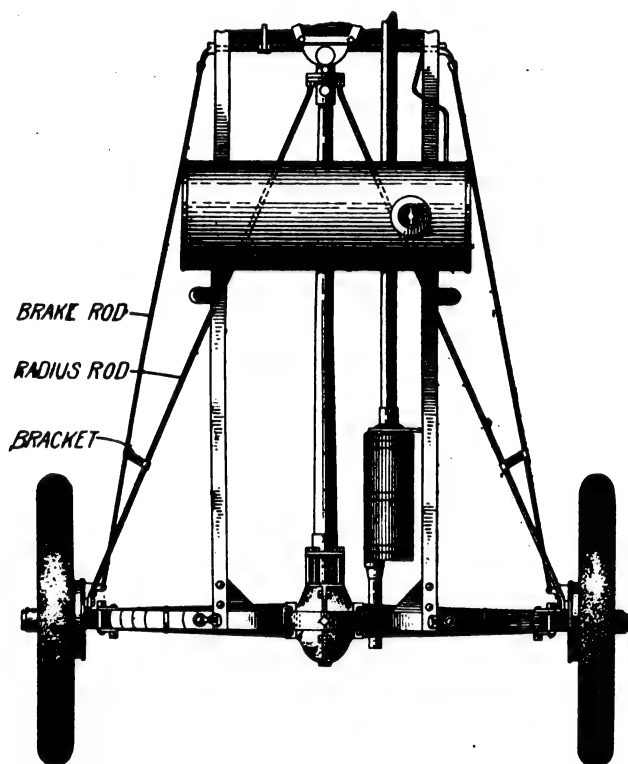
The Buick Model 1910.

From H. Jarrett, Florida.—In relation to the inquiry of N. A. Heffner, No. 925, in the July issue, my own experience may be of use to him. I have a Buick car, 1910. I find I cannot throttle it down to low speed, but by leaving the throttle slightly advanced and putting the foot brake on slightly I can reduce the speed the same as if I were going up hill. I do this constantly when going through a city where there is much traffic and have no trouble with it kicking. But if I try to run slow by retarding the throttle, it soon goes to bucking. I think you will find the Best spark plugs an improvement, as they do not get foul so quickly. I bought a set and put them all in at once. The machine would hardly run at all; tried for

several days but couldn't make them work. Then took out all but one (used three old ones) and it worked all right. After a few days I put in another; a little later I put in the third, and now have the four in, and it is running very nicely. It will run very slow on the battery but not near so slow on the magneto as I expected, but by using the brake a little I can go as slow as I wish, and that is pretty slow. It is better to open the throttle a little and use the foot brake than to try to go slow by retarding the throttle, as it will not work that way. My son adjusted the carburetor to suit the Best plugs. I have also been using more oil than I ought and have lately bought a heavier oil and I hope that will make it better. I hope this may be of some use to Mr. Heffner.

This May Cause the Rattle.

From O. Kariher, Ohio.—I noticed in your last issue, in No. 936, that Charles M. Esty of New York, has a rattle or ringing sound in the rear of his model T Ford car. I have a rattle in mine, but I know what it is. It



Showing the brake rods.

is the brake rod shaking up and down in the little brackets supporting the rods. These brackets are attached to the radius rods just in under the back foot boards. I have never been able to fix mine. This may not be his trouble but from his explanation it is similar to mine.

Foot Lever Rattle.

From C. E. Kindell, Ohio.—No. 913, Dr. A. D. Grant, New York, says he cannot find the rattle in his runabout. I had just such a rattle in a 1909 Overland and found it in the foot levers. By putting the toe of my shoe against it I stopped all the noise. Try it.

Lubricants for the Flanders.

From Pitt M. Page, Maine.—I notice in the July number your reply to J. A. Wicker, No. 922, whose Flanders uses too much oil. My car is a 1912 model, and it was using about one gallon per 100 miles. I remedied the

matter by putting a thick leather washer on the filler cap of the oiler. This cap presses down a rod which lets the oil into the crank case and the washer reduces the opening and I now get about 225 miles per gallon. I am using Harris medium oil.

Rattle and Solder Globules.

From George R. Wyckoff, M. D., Pennsylvania.—Replying to the query of Dr. A. D. Grant No. 913, in the June issue, I think I can locate his rattle. It is due to small globules of solder in the top of one of the side lamps. I have a Model T Ford 1911 and had the same trouble. I recently drilled a small hole in the top of the lamp and removed five balls of solder about as large as B B shot.

He Wants to Give Them a Boost.

From W. H. Wilder, New York.—I have a Brush car and have been bothered by its "skipping" until I procured a spark plug from the Sharp Spark Plug Co. of Cleveland, and it is fine. I do not now have one missed explosion and am more than pleased. I want to give them a boost, as the Brush is a car hard to keep from missing explosions even when all conditions are perfect. Please insert.

The Ford Rattling Sound.

From R. C. Gookby, Jr., Forsyth, Georgia.—Noting the query of No. 936 I beg to state that I have had trouble something like he describes and found it to be that the bushing had worn out around the brake rod pulley, where it entered the brake drum causing a rattling or ringing as it vibrated. I hope this may help out the gentleman if he has not found out the trouble.

Air-Cooling Efficiency.

As is well known, the Franklin air cooled car is remarkably low in fuel consumption. In Boston, not long ago a Franklin truck, carrying a load of 3,060 pounds, went 120 miles on 45½ gallons of gasoline. The claims of the Franklin Company is that this is due to the fact that with air cooling higher thermo-efficiency is secured and the full power of the gasoline is utilized. The heat units instead of being wasted are converted into usable power. They hold that the temperature of highest efficiency for gasoline vapor is 350 degrees, the temperature at which the Franklin motor operates. The water-cooled motor must operate under 212 degrees, the boiling point of water, or it will overheat. The difference between the temperature of the Franklin motor and that of the water-cooled motor, represents 138 degrees of heat that the water-cooled motor wastes but that the Franklin motor converts into driving energy. The motor is thus quick in response to the throttle, picks up more easily and runs more smoothly because the gas is at the right temperature.

Brakes and Their Effect on Tires.

Brakes not properly adjusted is another detriment to tires. One brake may be working more freely than the other, and one tire consequently may be compelled to stand all the strain of stopping the car. Adjust your brakes often. Be careful also not to run in car tracks or against curbs or in ruts. The side walls of a tire are as a rule thin and built to give the utmost resiliency. Every day you see a man come tearing up the street at 30 miles an hour, shut off power, put on brakes, and slide five or ten feet before bringing his machine to a stop. This is not only doing the car a serious injustice, but you can almost figure out the cost of rubber that he has used.

INTERCHANGEABLE BODIES.

How They May Be Made for the Same Chassis of Motor Wagons.

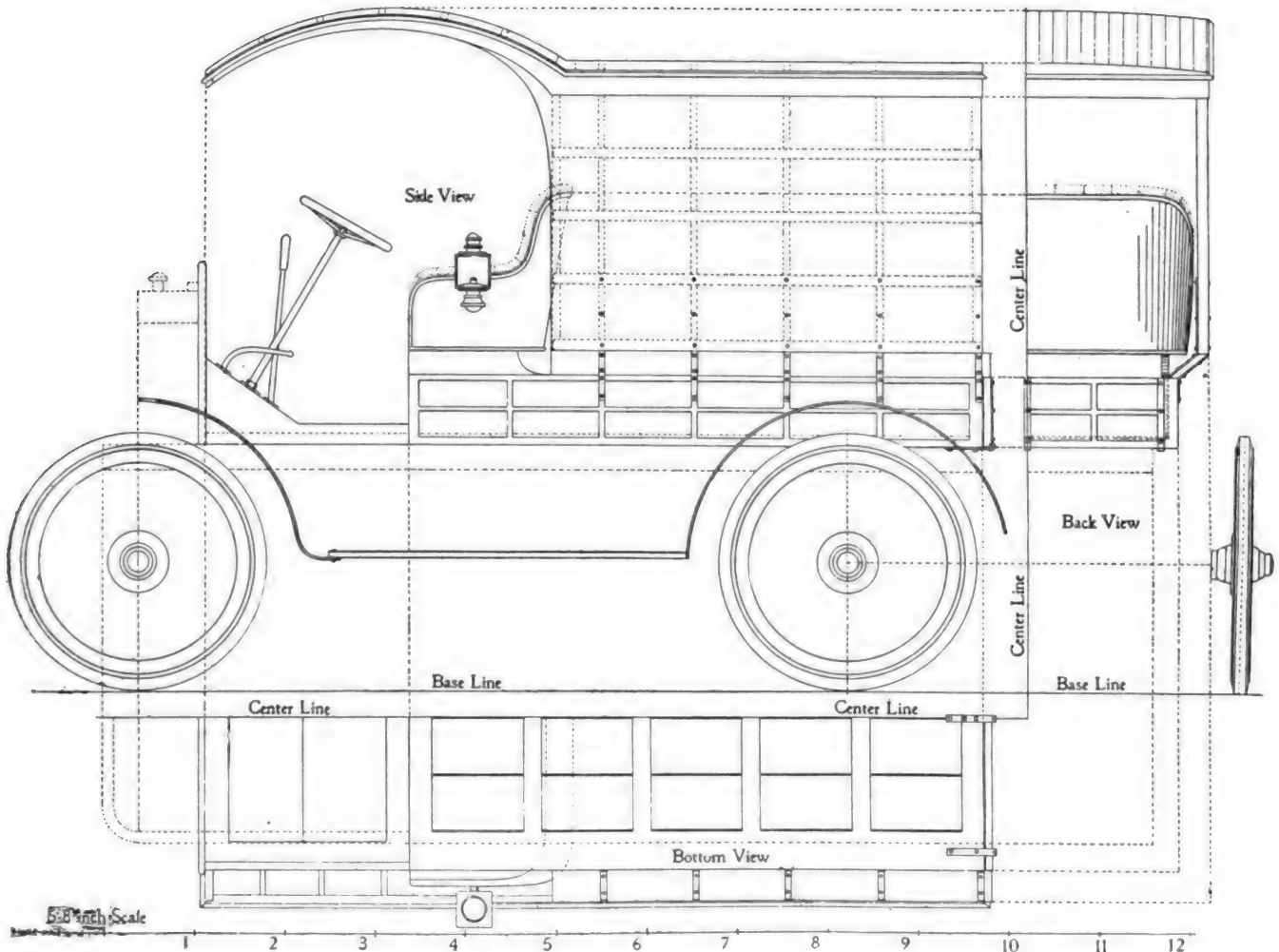
Interchangeable horse vehicle bodies have long been made and will be made occasionally, but they are of far more consequence on motor wagons and trucks. A horse vehicle gear costs very little, while a chassis with its machine is expensive, and the advantage of interchangeable bodies for it is thus plainly apparent.

With these drafts we illustrate three different kinds of bodies on the same chassis. Take for instance a business wagon body fitted with two automobile seats

Details of Construction.

The length of the front is $27\frac{1}{2}$ inches and the length of the body without the gate is 6 feet 7 inches, its depth 9 inches, and risers 3 inches, making the entire depth including $\frac{3}{4}$ inch for thickness of seat $12\frac{3}{4}$ inches. The foundation for the body consists of two sills, two end cross bars and four inside cross bars. The sill sizes are $1\frac{1}{2} \times 5$ inches, the end cross bars $2\frac{1}{8} \times 3$ inches, and the four inside cross bars $1\frac{1}{2} \times 3$ inches. The thickness of the bottom boards fill up the space between the end cross bars.

All the cross bars have tenons $1\frac{3}{4}$ inches long and $\frac{1}{2}$ inch thick, mortised into the sills. The $\frac{5}{8}$ inch thick-



Delivery wagon body with close panelled sides, wing boards and extended front. The front seat is stationary and the body is fitted on top of the wing boards.

and an extension top. The same body can be fitted with three seats by shifting the front seat six inches forward and the rear one ten inches backward, and lengthening the top, thus making a very practical passenger phaeton. As the space is very large between the seats two auxiliary seats can be placed there with very little expense and the top left as it has been designed and illustrated. The extension top is made to shift, and can be removed, including the rear seat, and we have a business wagon without a top, such as is used almost everywhere. If wing boards are needed, they can be made to shift and a close paneled body can be fitted on top of the wing boards. Such changes are inexpensive and are daily made for those who need them. The three illustrations will give the idea explained above.

ness on the end cross bars are lapped on top of the sills, filling up the space and at the same time strengthening the structure. The 9 inch by 6 feet 7 inch body sides are $\frac{3}{4}$ inch thick, are rabbeted 3-16 inch into the sills and drawn down with four strap irons on each side, and the boards are molded as shown.

At the front under the seat are four posts, two on each side, mortised into the sills and screwed against the board sides. On the top edge are two cross bars mortised into the posts, level with the top of the risers and to which the seat is screwed. The posts are $1 \times 1\frac{1}{2}$ inches, the risers $1\frac{1}{8} \times 5$ inches, which are screwed to the inside surfaces of the boards. The posts are cut $\frac{3}{8}$ inch into the risers, leaving more timber for the cross bar tenons. On the rear end there is a corner iron let in

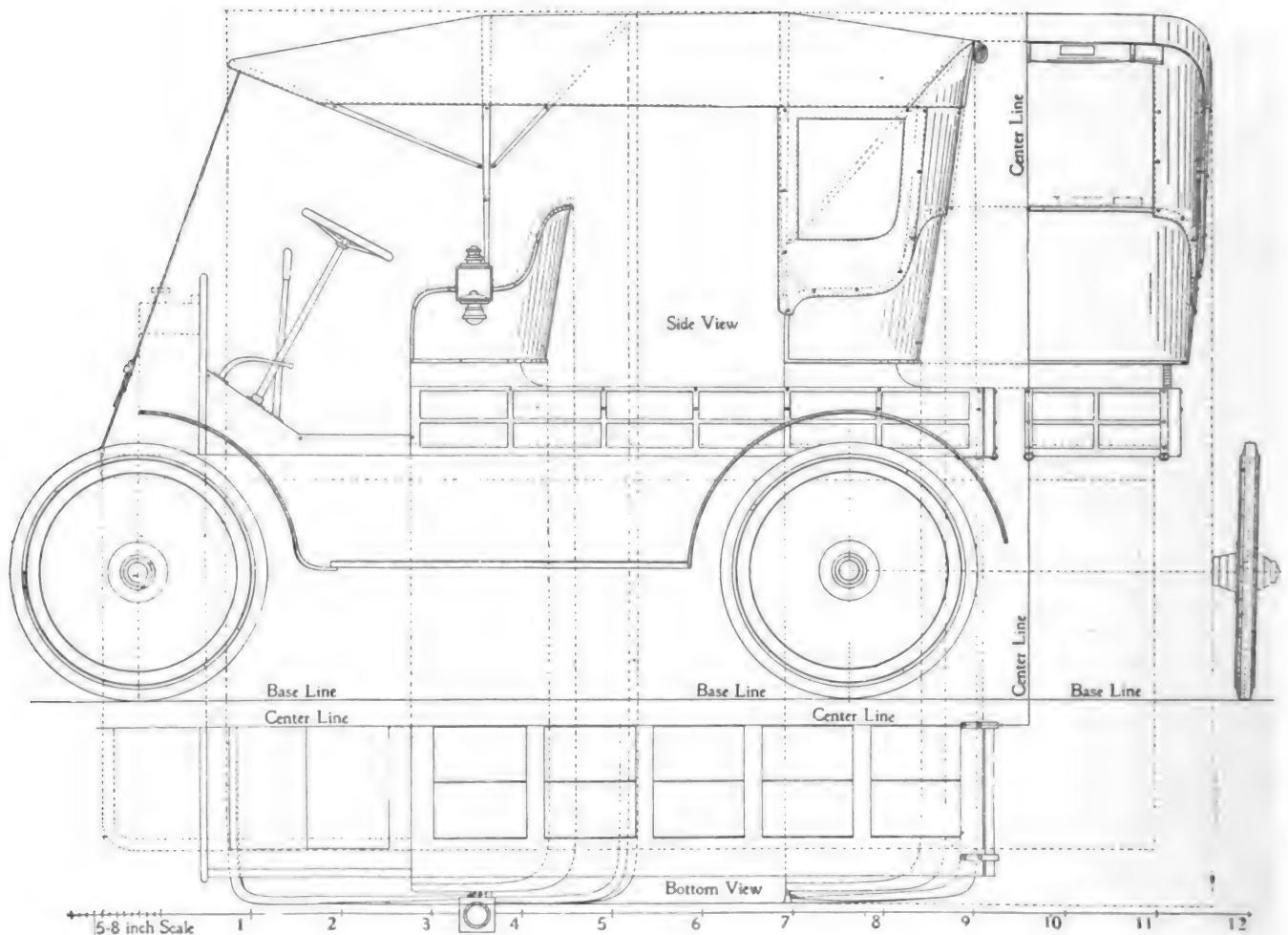
level with the cross bar, screwed to the bar and to the board sides to give strength to the rear end.

There are no side stays to keep the boards in position, therefore the iron stay must be put on inside. The rear seat riser is on iron stays with pins in one for each side so that the seat cannot slip. There are four bottom boards $\frac{5}{8} \times 8$ inches and two side pieces to fill up level with the rest of the boards. All the bottom boards are screwed to the cross bars and sills. All tenons are white leaded and drawn up to the shoulders with pins. All the bottom boards coming in contact with the cross bars are white leaded, so that they are not affected by dampness. The bottom board joints are left open 3-16 inch.

metal, but in all cases a rail is needed to fasten the panels and the trimming to.

The rails can be framed of separate pieces, but this is such difficult work that it does not pay and when done the rails are too heavy, therefore bent rails are used. Send the wood bender a full size side view of the seat or seats, give the width across and the amount of flare each side and order that the rail should be bent in two pieces for each seat and the joint to be spliced in the center. They are bent also in one piece, but they are handled better by the body maker in two pieces.

The lower front ends are either lapped or mortised to the seat frame, to give strength and stability to the



A four passenger motor body with two automobile seats and shifting extension top with shifting rail on the rear seat, illustrating how the back stays and side curtains are fastened.

The front part is separated from the main body, but has the same width apart.

The sills and the two cross bars are all the same size, $1\frac{1}{2} \times 3$ inches, and are mortised the same as the main sills. The two side pieces are $1\frac{1}{4}$ or $1\frac{3}{8}$ inches thick and are screwed against the sills. The bottom board can rest on sills if the space allows it, or can be rabbeted into the side pieces. The chassis is 33 inches wide outside, and 8 feet 7 inches long from dash to rear end, but in case a long body is needed, a great deal of length can be added to the rear end. On this design the length of the body from the center of the wheels to the rear end is 18 inches only, and another 18 inches can be added to that length.

The Seats.

The seats as drawn can be paneled, that is poplar or bass wood panels with grain up and down, sheet iron, sheet steel, aluminum or substitutes of this kind of

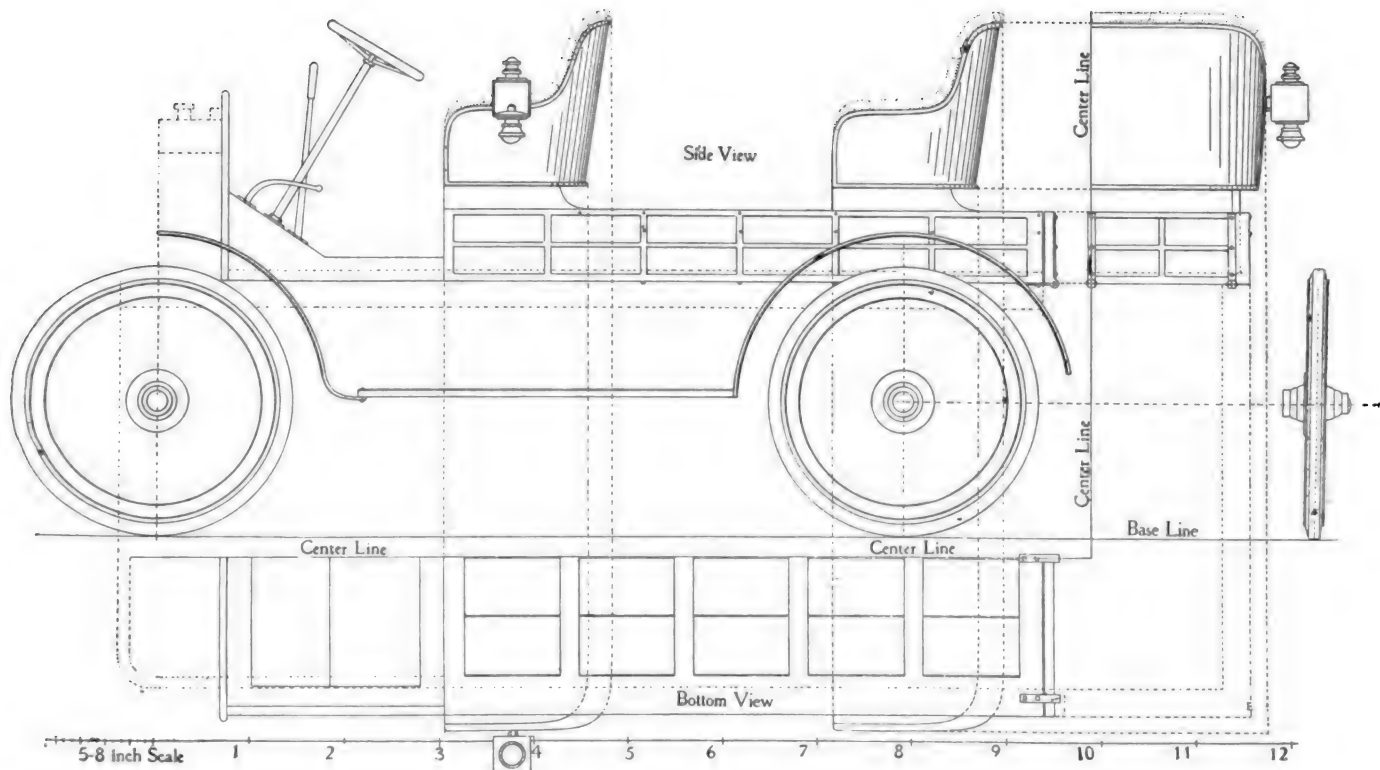
seat strainers $\frac{3}{8} \times 1\frac{1}{2}$ inches in size, and about four inches apart. These strainers, rail and seat frame, are nicely leveled and over this the panels are bent and fastened. To cover the nail heads, moldings are fitted. Metal moldings are the best as they can be well fitted and screwed. These screws are sunk below the surface and leveled with solder, which makes the very best kind of work, and is far superior to wood moldings bradded on.

The length of the extension top is 8 feet 4 inches, divided as follows: Front part 35 inches, center part 40 inches and rear part 25 inches. Height from rear seat to outside of bow 46 inches; drop of front vertical bow $\frac{1}{2}$ inch; drop of front bow $6\frac{1}{2}$ inches, and rear bow $3\frac{5}{8}$ inches; depth of side quarters at rear vertical bow 12 inches; width across the bows 47 inches and width across slat-irons $44\frac{3}{4}$ inches. The rear bow is contracted on the draft; that is the bow is narrower, but

this is not necessary. If not contracted the bow drops *easier* over the seat, but the appearance is better when contracted.

The side curtains and front apron are made similar to carriage work; the only difference is that every curtain and hood is larger. The rear side curtains have celluloid lights, which roll up with the curtains. For

The inside posts are $\frac{7}{8}$ inch square and the top rails $1\frac{1}{4}$ inches thick. On account of the extended front, and being so light, these rails should have an iron plate $3-16 \times \frac{7}{8}$ inches, tapered toward the front to $\frac{3}{4}$ inch. The top is covered with $\frac{1}{4} \times 1\frac{3}{4}$ inch strips, either close or $1\frac{3}{4}$ inches space between, and covered with imitation leather cloth. Its edges are covered with clip mold-



Four passenger motor body fitted with two automobile seats. The front one is stationary and the rear one may shift. It also shows the back view and how the risers are set inward.

the rear curtain on the rear view is shown a carriage light, but a large celluloid light is better. The back stays on the rear end are square, making a square back curtain, but on the side it must have the shape as drawn on the side view to look well. For curtain fasteners the auto pattern is used, as they are of the most improved kind. The seat trimming is either plain, as usually made for runabouts, or tufted. The plain is most suitable for exchangeable bodies.

The close paneled body is only part of a wagon body because it is fitted to the lower part. They can be fitted in two ways direct on the upper body rail, making the body 40 inches wide or on the wing boards, making the body 48 inches wide. The wing boards on which the body rests, as shown on the back view, are made to shift. Without a body resting on it the wing board irons rest in sockets, therefore are easily put on or removed, but as there is considerable weight when a paneled body rests on it and to make it sufficiently strong to support it, the stays are made to lap on the outside and inside with a rest on the top body rail bolted with two bolts for each stay.

If the upper body is the same width as the lower one, no bolts are needed. On the inside surface of each post is an iron $3-16 \times \frac{7}{8}$ inch, 20 inches long. These irons are 7 inches below the bottom rail of the body and each slips into two sockets which are fastened to the lower body posts. In this case the body is simply lifted from or put into the sockets without any bolting.

The construction of the body is similar to the regular wagon bodies. The end posts are $1\frac{3}{8}$ inches square.

The side surfaces are covered with $\frac{3}{8}$ inch thick panels and joints must be on the rails.

Death of A. W. Harris.

A. W. Harris, president and general manager of the A. W. Harris Oil Company, Providence, R. I., died June 30, after a short illness. Not alone will his loss be felt in business circles, but throughout a wide social acquaintance. When the automobile industry first began to attain prominence, more than a decade ago, Mr. Harris was one of the first to enter the field of supplying high-grade lubricants for gasoline motors. Mr. Harris descends from a long line of Americans who have done things in the mechanical world. His uncle, William A. Harris, was one of the builders of the famous Corliss engine. He leaves a wife and daughter.

How Accidents Are Reduced.

How France manages to keep the number of automobile accidents down is illustrated in the following incident which occurred recently. A speeding motorist, whose car had killed a pedestrian, was sentenced by the court to serve one month in prison, to pay \$200 annually to each child of the victim until the child attains its majority, and to give the victim's widow \$3,000 in a lump sum.

Radiator leaks are often caused by steam, which, unable to escape through clogged up filling cup, forces itself out through weak places in the radiator. The prevention is to keep the cap vents open.

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ADVERTISING RATES MADE KNOWN ON APPLICATION.

NEW YORK, AUGUST, 1912.

Missing Numbers—Our Readers are requested to remember that it always gives us pleasure to re-send numbers which have gone astray in the mails.

The Automobile Dealer and Repairer in Australia and New Zealand.

Mr. R. Hill, Matlock House, Devonport, Auckland, New Zealand, is our accredited representative in Australia and New Zealand for obtaining new subscriptions.

AUTOMOBILE PRICES.

A reader asks if we think the price of automobiles will be lower in the near future. He says he does not want to purchase a car and then have the manufacturers sell the same model for 20 per cent. less in the course of a few months.

Any immediate reduction in the price of automobiles will depend either upon less expensive selling methods or cheapened cost of production. The price of the automobile of today is not artificial. With the sharpest kind of competition, and the most active and aggressive selling methods, prices have been reduced just as fast as it has been possible to do so with legitimate business methods.

Nor is there much likelihood of either reducing the selling expense or the manufacturing cost in the near future. Competition always takes good care that prices are not artificial, and as long as this exists, the purchaser of an automobile may be sure that if the car be a standard one he is getting his money's worth.

VICE, PER SE.

A reader of The New York Times is of the opinion that in many cases owners of automobiles drive recklessly and court accident for the purpose of getting their cars smashed up and securing the insurance.

This is very unlikely. There is a good deal of human depravity in the world, but such practice would not work well any more than does the burning of other property for the insurance.

The smashing of automobiles is the result of recklessness and this in itself would not be so bad. If a man has so little regard for a valuable piece of property that he smashes it to pieces, why, he gets just what he deserves. It is only when he endangers the lives of others that the act should be legally reprehensible. He has a right to endanger his own life, and we are not sure but what he has a right to de-

stroy it this way, if no one else has any claim upon it or him.

There should, and possibly there would, be no legal restraint against one from doing anything he wishes if he alone is to suffer the consequences. If a man be intemperate, does not the self-penalty "fit the crime," in the words of the lamented W. S. Gilbert? If he take his own life even, will not the punishment be sure and sufficient, provided of course, it be a crime? And we are inclined to think it is one unless he be absolutely under no obligation to any one else, and is too mean and wicked to live.

We believe there is too much legal interference with the individual when his own wicked or selfish or reckless practice harms no one but himself, and too little when it harms some one else. Perhaps if there were less interference the world would be sooner rid of that breed. But all this is another story.

WHEELS.

Signs that the wire wheel is gaining in favor still continue. As the wheel is one of the most ancient ideas in mechanics, having been applied to use in vehicle propulsion hundreds of years before the Christian era, it would seem as if it had ample time to reach the finality of economic construction, but such is not the case. In England and on the Continent the wire wheel seems to be common, and partly because it is difficult to secure good second growth of hickory for the spokes, but in this country wood wheels of the artillery type are by far the most common.

Then there is the disk wheel. If all reported of this form of construction is true, it should gain in popularity. This wheel is built up of two pressed steel plates that are fastened together at the rim and the hub. It makes an extremely easy wheel to clean, is said to afford as much strength as any other type, weighs less than a wood wheel, and but slightly more than a wire wheel. It is being used on the Mercedes car and possibly on two or three others.

But without going into the matter exhaustively, much less attempting to speak with authority concerning something with which manufacturers of automobiles should be more familiar, it should not be forgotten that the lighter a wheel can be made the better, provided, of course, that it has sufficient strength. Were it not for the question of weight and strength, the greater the circumference of a vehicle wheel the better. We know no reason why automobile wheels should not be at least five feet in diameter, save that in order to get the desired strength, the necessary weight would be prohibitive. For it is essential to increase the weight of a wheel much faster in proportion, when increasing the size, in order to maintain the desired relative strength. The advantage of wire wheels is in their lightness in proportion to their strength.

Possibly some reader may not fully understand this question of weight as applied to wheels. But if sufficiently interested, let him procure for a test, a light horse drawn carriage fully equipped, and likewise the running gear of some heavy truck—stripped of everything possible save the axles and wheels. Have the two vehicles as near as possible of the same weight. Then test the comparative power necessary to pull each. He will find that the heavy truck pulls far harder than the light carriage, although each is of identical weight. Or let him make a test of the power necessary to propel the same vehicle with light wheels and with wheels twice as heavy, and the result will be the application of nearly twice as much power to

pull the vehicle with the heavy wheels as with the light ones. But let him put some commodity in the carriage when it has the light weight wheels attached; let it be of the same weight as the difference between the weight of the heavy wheels and the light ones, and he will find that the necessary propulsive power is *not* greatly increased.

So much for wheels. If any reader holds different views as to the importance of light wheels in their relation to the necessary propulsive power, we should be glad to hear from him.

WANTED—MORE IDLE RICH.

We hear a good deal of complaint against "the idle rich," and some say it is one cause of the prevailing discontent among the masses.

If those who live by the work of their hands feel aggrieved at the idleness of the rich, such feelings are unjust. Under present conditions of production and consumption, the more idle rich we have the better.

What we should try to avoid is the idle poor. The great industrial need of today is work—plenty of work for all—work so abundant that the workers need not form themselves into labor unions to keep up artificial wages; work so abundant that it will not be necessary to put to work the children of the adult toilers. For child labor is due to the scarcity of work and not because it is plentiful. We need work so abundant that the workers—without the aid of their unions—can have as much control over the price of the labor they sell as the employer has over the things he sells.

Is there anything unreasonable or unfair in wishing for such a condition? Is it not desirable that moderate welfare should be as widely diffused as possible?

Let the idle rich continue to be idle and give the work to the idle poor. As long as we in this country can produce in eight months of the year as much as we can consume in twelve months, none need worry about the idleness of the rich. It is not producers we need but consumers.

Not long ago a newspaper highly complimented a certain rich woman because she "always trims her own hats." Well, if she does, she ought to be ashamed of it. There are plenty of poor women who sorely need hats to trim and dresses to make.

A good deal that may be said in relation to idleness and leisure, by themselves considered, but a distinction should be made between enforced idleness and idleness from choice. Yet in an economic sense, the idleness of the rich under our present marvellous productive capacity, prevents just so much enforced idleness and destitution of the poor. The idle rich still consume; the idle poor must either reduce consumption in proportion to their enforced idleness, or become charity dependents.

THE ONLY SAFE WAY.

Do not engage a man to drive your car unless he is a total abstainer from alcoholic liquors. The writer of this has no patience with fanatical ideas concerning liquor drinking, but it goes without saying that any man of sense believes in temperance. As to the prohibition of liquor drinking by law, however, where it can be enforced it is not needed, and where it is needed it can't be enforced.

Yet it is safe to say that one-half the flagrant automobile accidents of the country, or the accidents that might easily have been avoided, are altogether due to the brain being in an abnormal condition owing

to the use of alcohol in some form or another. We have abundant evidence of this from a careful reading of the reports of such accidents.

Take the case of a shocking accident not long ago in Atlanta, Ga. First, the car was taken from the garage without the consent of the owner, and second, the car would never have been run against a post by the miscalculation of the driver had his brain been in its normal condition. The result was the wreck of a fine Stearns car, the death of the chauffeur, and the injury of the other riders. It was all the result of a drunken "joy ride."

Nothing serves more to warp the faculties of discretion than a little alcohol, but when to this is added the exhilaration of driving or riding in an automobile itself, which is a sufficient tonic for all jaded brains or bodies, indifference and unconcern run riot. The only safe way for the automobile driver is to "cut out" drinking alcohol in any form.

DOUBTING AND BELIEVING.

Although much has been lost by individuals who are inclined to be gullible, quite as much may be charged up to the profit and loss account by the cautious doubters, and of the two qualities the former is rather the more honorable trait. There are Joshuas of today who try to make the sun stand still. They go through life surrounded by an impenetrable armor of suspicion and thus lose much both materially and mentally. If there were no believers in new ideas, no pioneers, the world would be about where it was a thousand or two years ago. It is the part of wisdom to have an open mind.

Yet holding this view, it is doubtful if the invention of a Los Angeles, Cal., man will "revolutionize the automobile industry" as has been so generously claimed. This invention is a new propelling power. According to newspaper reports, "the mechanism from which the power is derived consists of springs instead of electricity or steam. The device is an exceedingly simple one, deriving the power from the main driving spring attached to the driving shaft and geared to make from 5 to 125 miles per hour, and according to gearing can be made to run from six to twenty-four hours without the use of the auxiliary springs from which additional power is gotten to rewind the main driving spring. This is accomplished by a set of shift gearing operated by driver with pedal attachment and automatically releases itself upon rewinding of the main spring. The two auxiliary springs rewind from the momentum of the car at the will of the operator." It is likewise reported that thorough demonstrations of the success of the idea have been made, and that a company has been formed to manufacture the cars.

Spring power is nothing new. One of its chief defects is that no more power can be taken out of a spring than can be put into it, and a 40 h.p. spring would be something enormous in weight and size. However, some 75 years ago when iron vessels were first proposed, the wiseacres said: "Iron won't float." Yet it will float and does float.

A NEW FORM OF CRIME.

We don't want to inspire any unnecessary apprehension, but something recently occurred in New Jersey which we have long expected in localities where tramps and desperadoes are common. Two men were riding in a car at nightfall when they ran into a small wire that had been strung across the road at about

the height of their heads while sitting in the car. Fortunately, they had a wind shield up which bore the shock and broke the wire. Otherwise they would each have been beheaded.

It seems to us that a crime of this devilish nature is comparatively easy to perpetrate and that there are vicious criminals and desperate derelicts enough roaming around in country districts who would not hesitate to attempt it.

We see no remedy for it, save keeping up the wind-shield in localities where the covers at the sides of the road offer a fair field for such an attempt, and the locking up or putting to work of every individual in the country who is unknown to the authorities and who cannot give an account of himself. Of course the only object of such a villainous trap would be robbery.

In passing, it should be stated it is high time that tramps everywhere be rounded up and put to work in some sort of public service. Every man who is unable to find work should be given employment at the public service; there is work enough of this sort that might be done. Every man who does not want to work should be either locked up as a public menace or likewise put to work in public service. A tramp army in the 20th century of civilization is rank: it smells to heaven. It ought to be wiped off the face of the land.

NOTHING PERMANENT BUT ACTIONS.

From all over the country there comes a protest against so much reckless automobile driving. As we have before remarked, how any one can think of driving a car on a public ungraded highway as fast as a locomotive is driven on a graded private highway, is beyond comprehension.

Those who take chances in driving—because they are in a hurry or simply from the pure joy of high speed—seem to forget that actions are really the only permanent things on earth. Our thoughts may be bad and yet produce no injury; they may be good and yet produce no benefit. Our riches may be taken from us by misfortune, our reputation by malice or something of the sort, our health by disease, our friends by death. But our actions follow us to the grave—and beyond. They cannot be disinherited or otherwise wiped out. Neither time nor death can destroy them. After they have been taken, Omnipotence cannot change them to the extent of a hair.

Considering the absolute immutability in itself of our acts, it is the part of wisdom to guard them closely in the case of something that may be as momentous as reckless driving.

A PRIVILEGE AND NOT A RIGHT.

Dante, the poet, provided a most scientifically ideal punishment for the several grades of sin, although we always thought he was rather severe upon those who "blow neither hot nor cold" in consigning them just to the edge of hell.

But were Dante now alive, he would have some difficulty in fixing the correct grade of after death suffering for those who run over people with automobiles and then run away. Surely, there is nothing in the category of sin that is much more contemptible.

A new Missouri law attempts to provide suitable punishment by making the act in itself a felony. And while this will not prevent the unscrupulous from running away if he thinks he has a good chance, he will not be quite so ready to take that chance. But no sooner had the law been put in force than a singular

attempt was made to declare it unconstitutional—always the last recourse of those who "have not a good opinion of the law." It appears that one Forrest E. Kneeder ran over and killed Frank Farrar. He slunk away, but he had been recognized and was arrested and later indicted under the new law. In habeas corpus proceedings he maintained that the law was unconstitutional because the constitution of the State declared that "no person shall be compelled to testify against himself in a criminal cause." Judge Ferris, of the Supreme Court, held that giving one's name and address did not constitute testifying against oneself, and that the law was a reasonable exercise of police power. The person who, after running down a pedestrian, stops to do what he can to make amends and voluntarily gives his name and address to the police, comes very far from testifying against himself. On the contrary, his conduct shows that he regretted the accident and it would be construed in his favor. On the other hand, a man who runs away does testify against himself and brands himself as a heartless coward.

"The statute is a simple police regulation," said the judge in his opinion. "It does not make the accident a crime. If a crime is involved it arises from other statutes. It does not attempt in terms to authorize the admission of information in a criminal proceeding. The mere fact that the driver discloses his identity is no evidence of guilt, but rather of innocence. Every person who operates or uses a motor vehicle must be regarded as exercising a privilege, and not an unrestricted right. It being a privilege granted by the Legislature, a person enjoying such privilege must be subject to all restrictions."

The words of the judge are thus quoted because many who drive automobiles seem to be under the impression that the act is a right and not a privilege. Possibly a little more privilege feeling and less of the feeling of "right" would make the highways and streets safer.

A LONG STRUGGLE.

The Massachusetts Institute of Technology has been studying for the past 13 months the relative cost of electric, gasoline and horse transportation vehicles, and has got far enough along to make a four or five thousand word "preliminary report."

We have availed ourselves of the privilege of carefully reading this document and now know less about the subject than before. But the investigations are still going on, and in the course of another year or two something that approximates the facts will doubtless be published.

If not against the rules, however, will state that under most conditions the horseless truck is more economical than the horse truck, and that in many places the electric truck costs less to maintain than the gasoline truck.

NO RUBBER SHORTAGE.

Our readers have doubtless seen something in the press in relation to a substitute for rubber. This artificial rubber is said to have been produced by the "polymerization of isoprene," which means about the same as combining isoprene with other chemicals, if we are not mistaken. Isoprene is made from starch.

Some chemists claim it will be possible to produce rubber in this way for 60 cents a pound, or about one-half the average retail price at present, and one-third

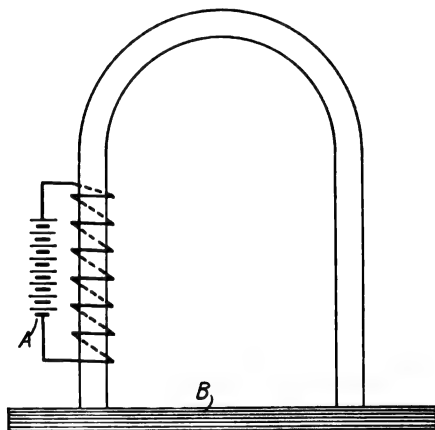
less than the actual cost of plantation rubber at the forest. The new process has been received with reserve, however, both in England and Germany, on the ground that the merits of this synthetic rubber must be much more fully tested before confidence can be placed in its commercial practicability.

Attempts are also being made to successfully regenerate rubber, but it is said to be impossible to eliminate the sulphur without destroying the molecule.

But no apprehension need be felt. Natural rubber is largely increasing despite its enormous increase in use. Those who are in a position to know say that in a very few years we may rely upon 76,000 tons of wild rubber annually and 98,000 tons of plantation rubber. This is likely to meet the requirements of the civilized world for all purposes.

A Weak Magneto.

If the magneto gets weak the best plan is to send to the manufacturer and have the magneto remagnetized. If this is impossible, however, the illustration shows a plan whereby the magnets may be taken off the frame by the simple expedient of unscrewing the holding bolts, and after winding a coil of perhaps a hundred turns of No. 18 B. & S. double cotton-wound magnet wire, which is always of copper, the coil is slipped over one leg of each permanent magnet in the process of remagnetizing and the two ends of the coil may be attached to the terminals of the storage battery, making one of them fast and holding the other end of the magnet wire in the hand, making contact, after which the circuit is broken by drawing the wire



Plan of Remagnetizing

slowly away from the terminal of the battery. A half-dozen applications of the current in this way will suffice to remagnetize the members of the magneto, and they may then be screwed back into place, after which the magneto should perform its function of generating current for ignition purposes. In the illustration A is the battery and B the keeper.

The 1913 Schacht Car.

The Schacht Motor Car Company of Cincinnati, O., for 1913 will offer in the pleasure car line two models distinctly different in body design, but built on the same chassis. These will be their model "NS" five passenger touring type and the model "KL" roadster.

Their chassis for 1913 is practically of the same construction throughout as 1912 with only such minor improvements as might have been required. The chassis specifications cover 120 inch wheel base, with 36x4 tires and demountable rims with one extra rim. Their prices are \$1,775 and \$1,600 on the touring models and road-

sters respectively, covering a complete equipment and self starter. Both models will be, of course, the fore door types, and will have the left hand steering with center control. All bright parts will be fully nickel plated. The standard motor for 1913 will be of their new monobloc design with three bearing crank shaft, the bore is 4¼ inch and the stroke 5½ inch, making this practically



Schacht 1913 Model 5-passenger touring car.

a long stroke motor and is rated at 45 to 50 hp. The cellular radiator is used altogether and wherever possible, the cars have been improved, full floating axles are used exclusively and the brakes are being made larger than last year.

Washing the Car Correctly.

Eugene F. Russell, factory manager of the Locomobile Company of America, gives the following advice regarding the washing of a car:

"To wash a car properly with soap, first dissolve in a pail of water sufficient soap to make a good suds. Then in the washing operation use the suds, sopping it on from the sponge instead of rubbing the soap on a wet sponge, or, what is worse, rubbing it on the surface of the car. Before applying the suds the car should be rinsed thoroughly with water, using a gentle stream. This is important, as all particles of grit and dirt must be removed from the surface before applying the sponge. Apply the suds liberally where the parts are dirty; then rinse off with clear water and a fresh sponge, flowing the water below the sponge to insure that any grit and dirt that may be left on the surface is washed away before the sponge has a chance to pick it up and scratch the surface. After the final sponging the surface should be dried with a clean, wet chamois.

"In washing the chassis the same method is in order, except that it may be necessary to use stronger suds. Where cars are in use over oily or muddy roads frequent washing is necessary, and this washing should be done as soon as possible after the car leaves the road, as when this oil or mud dries on the car it is very difficult to remove and will damage the varnish, it being impossible under certain oil and mud conditions to remove all the stains. In this connection it is important that neither the bonnet nor radiator is washed while it is hot, as to do so will dull the lustre, ruining it in a very short time.

"Another point which should be given attention is that the same sponge should not be used for washing both the body and the chassis. Both sponges should be of the best quality, care being taken at all times to keep them clean and in proper condition. Owners who keep their cars in public garages will have difficulty in having their cars washed before the mud has had a chance to dry, as in most garages the washing is left until night and then put through with a large number of other cars. This method cannot be followed and have a fine looking car."

LESSONS FOR DRIVERS.

Carelessness and Ignorance Responsible for Most Accidents.

It need hardly be stated that this department is carried on from a sense of duty we feel we owe to our readers. It is of course true that few who have never been in an accident feel they need the warning, and many of those who have been the victim of an accident do not need it; either they are beyond the need of any and all warnings or the lesson learned from the accident in which they were victims was sufficiently impressive to last them to the end of their days. So those who feel they need any such lesson as these accidents give are not very many. However this may be, the duty is none the less imperative. Every editor is a heavy debtor to his readers, and he cannot give them the value of their subscriptions unless he recognizes this at all times and under every condition.

Still Many Cranking Accidents.—One would think that accidents due to careless cranking would be few and far between now that its dangers have been again and again impressed upon car owners and also that self-starters are so common. But such is not the fact. Fully a dozen have been reported at this office during the past month. To give details of more than one would be monotonous. For illustration, a man and his wife started out for a ride, near Jamaica, L. I. He was teaching his good wife, so she could drive if necessary, and finally he stalled the car. He jumped out to crank it, leaving his wife in the driver's seat. Before starting to crank the car, he forgot to throw out the clutch controlling the machine's power. As a result he had no sooner turned over the engine than the machine leaped forward. He tried to jump out of its way, but was not quick enough. The left front wheel struck him, knocking him down and ran over him. Then the left back wheel passed over his body. The mudguard or some other overhanging part threw him in front of the right front wheel. It ran over him, as did the right back one. Altogether he was run over four times, in each instance by a different wheel of his machine. Meanwhile his wife was making frantic efforts to bring the car to a halt. But her terror at the accident drove what little she had learned about the car from her mind and she was unable to slacken its speed. Finally, after twisting uncertainly across the street the machine brought up with considerable force against a sign post, badly smashing the front of the car.

Three Killed Beneath a Car.—Three persons were killed at midnight near Duluth, Minn., when their touring car skidded from the road and overturned, pinioning its occupants beneath. Three more were injured.

An Unlucky Day.—A Newburgh, N. Y., man broke a spring on his car and hired another one to take himself and party to their destination. The party boarded this machine and all went well until they were climbing a steep hill. There was a back fire in the carburetor, and before they realized what was happening the car was in flames. The man jumped out and hauled out the other members of the party in time to save their lives, but they could do nothing with the car, and it was totally destroyed. A mile away from the burning auto a man and a woman were speeding to their aid, having seen the smoke of the burning car. The machine skidded and overturned. The car was badly damaged, but the occupants escaped with a few minor bruises.

A Bird in Her Face.—A woman was nearly killed near Greenwich, Conn., when a bird flew between the glass windshield and her face. The bird caused her to let go of the steering wheel and the car ran head on into a tree, smashing the windshield and wrecking the front of the car. Her lower lip was cut in two. She received only a few other bruises. The bird was found dead in the bottom of the car.

A Blowout Wrecks a Car.—Near Burlington, N. J., the shoe of one of the tires of a back wheel of the car which a man was driving, blew off and the machine skidding over the oily road ran into a tree, smashing the machine while the occupant was thrown into the road. As the car ran into the ditch the shock was such that the only occupant was thrown into the road, but landing in some sand was not seriously injured. The machine was completely disabled, both front wheels and the steering gear being broken and the front part of the car badly damaged.

A Young Girl Was Driving.—Three persons were run into by a locomotive near Poland, N. Y., when attempting to cross the track. The daughter of the owner of the car was driving and drove directly in the path of the locomotive. The automobile was carried fifty yards and spun around. The young woman escaped with a severe shaking up. Another woman was taken to the hospital here with her arm broken, broken ribs and severe contusions. The other three passengers were killed.

Just an Attempt at Cranking.—A man, his wife and family of Shamokin, Pa., went out with their car joyously, for a spin. When their journey was half over the man stopped the car to turn around. His wife and family stepped out and while awaiting for them to alight safely before turning, he stalled his engine. Forgetting that the engine had been reversed, he got out to crank the car and as he turned over the engine, the car shot backward with great speed, went down over the hill to the railroad where it was brought to a sudden stop on the tracks. The evening passenger train was due about this time and as it appeared several hundred yards above, a trackwalker flagged it.

Neck Broken by a Wind Shield.—A man was thrown against the wind shield of the car he was driving in West Haverstraw, N. Y., and had his throat cut and his neck broken. The accident occurred while he was trying to turn out in order to pass another car.

An Axle Broke.—A man accompanied by his wife and another woman were making the last lap of an extended tour and when about four miles east of Newark, O., as they were ascending a hill the axle broke and the car was badly damaged. It ran back down hill and the occupants had a narrow escape.

Artificial Rubber.

For many years there have been reports of new processes by which synthetic rubber will be made to supersede the natural plantation variety, and, while manufacturers as well as consumers have been at odds in the credence which they bestow upon the process and its product, there has been mutual interest in determining whether artificial rubber will rival Para rubber in wearing qualities as well as in price. The elements contained in rubber have been ascertained by analysis, and these elements have been artificially built up until a manufacturing compound was reached. The exact proportion of each element is but the beginning of the chemist's diffi-

culties. The material that has been used invariably has cost more than the plantation article.

Starch is the base of the new rubber compounds, and if they ever prove successful from a commercial standpoint it may not be impossible to produce tires as well as alcohol from the starch of potatoes.

German scientists were first to discover the production of rubber from isoprene treated with sodium. While there have been single instances of satisfaction from cars fitted with these artificial tires, the single cases do not prove what can be done in a general way. The isoprene is obtained from amyl dichloride, which in effect is amyl alcohol, with a chloride added to facilitate its conversion into isoprene. This amyl dichloride is obtained by treating fusel oil with hydrochloric acid, and the fusel oil itself, in common with acetone, is obtained by fermenting pulp or mash made from potatoes, maize or any other grain producing a starch base.

Fusel oil and acetone, by the way, are valuable by-products which command ready markets and high prices. After fermentation of these two products they are separated by a simple process of distillation, and the fusel oil is passed through various stages of conversion into isoprene. When the isoprene stage has been reached the liquid is treated with sodium, which slowly renders it thicker and thicker, until finally after patient treatment and washing a material resembling the latex, or milky juice, of the natural rubber plant is obtained. The process of manufacturing which follows is similar to that applied to natural rubber.

Tire Overloading.

It is frequently said that 5 per cent. added to the weight of a car adds 15 per cent. to the wear and tear

by the following: Equip your car with the largest tires possible. They will cost a little more, but the extra initial expense will be economy in the end. Larger tires, in addition to being more economical, mean less trouble and more solid comfort in riding.

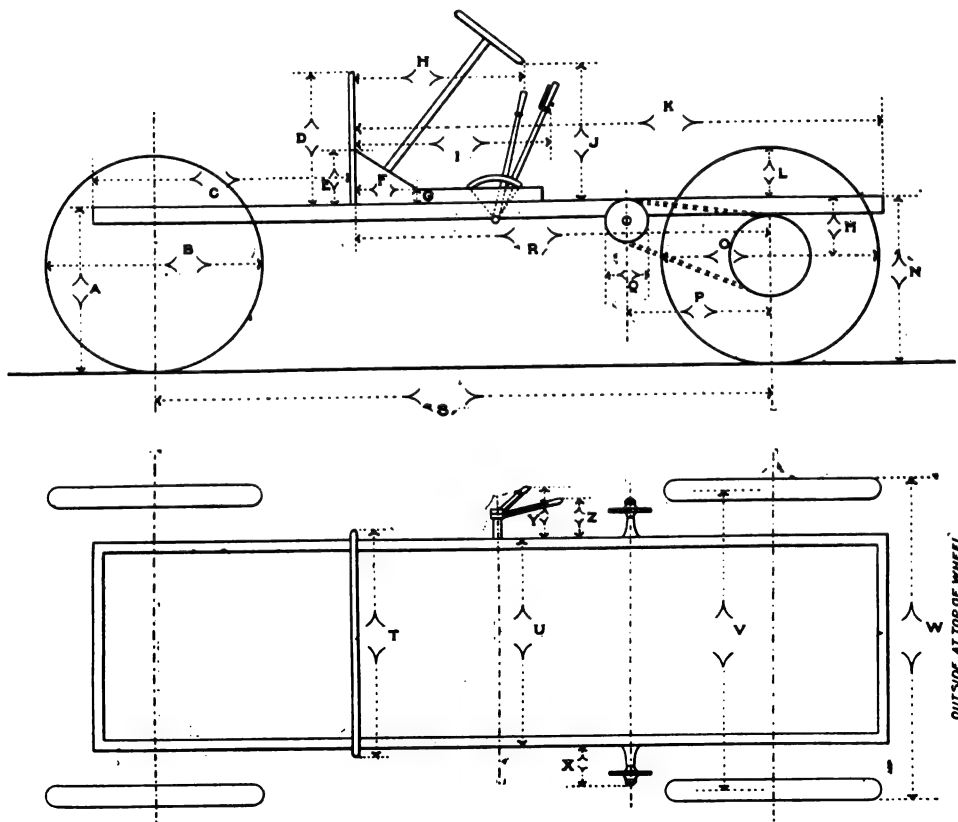
THE BODY BUILDER.*

Directions for Correctly Measuring Dimensions of the Chassis.

From G. J. M., New York.—In these days of strenuous business activities for the repair man when the volume of business depends so largely upon quick deliveries of the finished article to the customer, and incidentally upon the delivery coinciding with the promise to deliver, it is essential to adopt more system in doing the work than has heretofore been thought necessary.

The revivifying influence of being up-to-date is always accompanied by the genial spirit that throws open its doors and invites the public to come in and inspect the work. One of the newest things that is meeting with praise from all who have tried the experiment is the issuing of blank forms or diagrams, similar to the one in our illustration. By similar we mean one that is applicable to the needs of your particular business.

The impression that is produced upon your customer is alone worth the initial cost of the printing, because he realizes that you are prepared to do business and are not intending to make your first acquaintance with the automobile business at his expense. The business effect in connection with such a diagram as our illustration is apparent to any one



Letters show where measurements are to be made.

of tires, so it can be easily seen what effect overloading has on the life of tires. It means frequent punctures and blow-outs and early ruination. Ask your nearest dealer what your car weighs, then be guided

who is used to having method in his work. It is an aid to the memory and it produces an assurance in the mind that nothing has been forgotten. Your customer can be relied upon many times to fill out the

measurements, thus saving time and expense to the busy repair man. Another thing, the customer becomes acquainted with the intricacies of the repair man's work, when he fills out the blank and he will understand and appreciate a fair price for the job. The chart or diagram here shown is designed for use when measuring the chassis for the body builder. It is applicable for any and all makes of cars, and when allowing for clearance between the rear wheel and the mud guard or fender allow for the addition of skid chains. This is very important and will avoid any disagreement with your customer later on. The proper clearance between wheels and mud guards is the amount that the springs will deflect under the maximum load.

THE REPAIR SHOP.

Something About Plans, Convenient Arrangements and General Fitting.

Anything like exact instructions or illustrations for an automobile repair shop are impossible. Conditions are as widely varying as, for instance, the price of a yard of cloth. But it goes without saying that the building should be well lighted, ventilated and either fireproof or of slow-to-burn construction. If to be used only for repairing but one story in height; if to be a combined garage and repair shop two stories. A one-story shop can have a frontage of two stories, the upper story extending back perhaps one-third the length. In a two-story building the lower floor can be used as the garage, the upper as the repair shop. In all cases, the best lighted room or floor should be used for the mechanical work. If artificial light is necessary during the day the character of the work produced will not be of the highest standard, there will be greater strain upon the workman, more time will be required to do the work, and the overhead expenses increased.

High structures involve the use of elevators, that

feet deep, four feet wide and 14 feet long. The edges of all pits should be sharply defined by a frame of scantling, this being a guard to prevent the wheels rolling into the pit while maneuvering a car about it. The arrangement of lockers, washing and toilet facilities are shown in the floor plan shown herewith. The washstand may be a cast iron sink, or the enameled individual steel washbowl series. All should have separate hot and cold water faucets, though they can discharge into a common pipe. The location near

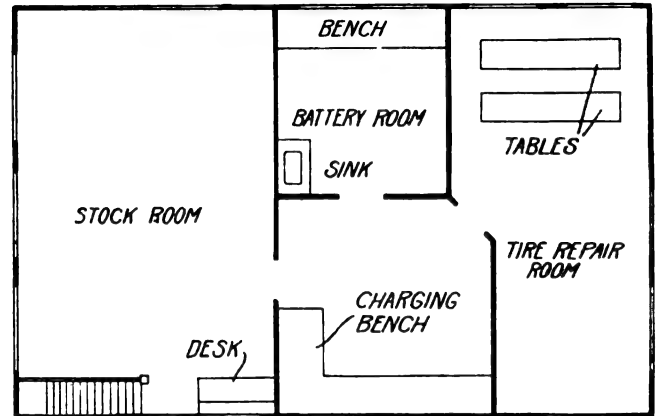


Fig. 2.

the heater simplifies the plumbing and provides hot water without delay. The lockers should be about 18 inches square and six feet in height, having a shelf about a foot from the top, and provided with hooks for clothes. All doors should be fitted with locks, and the workmen charged a nominal sum for the use of the key, to be forfeited if the key be lost.

Lighting should be by electricity if possible, and the lamps should be provided with shades. They should not be less than 32 candle power, and there should be plenty of them.

As to the tools, they should, of course, depend upon

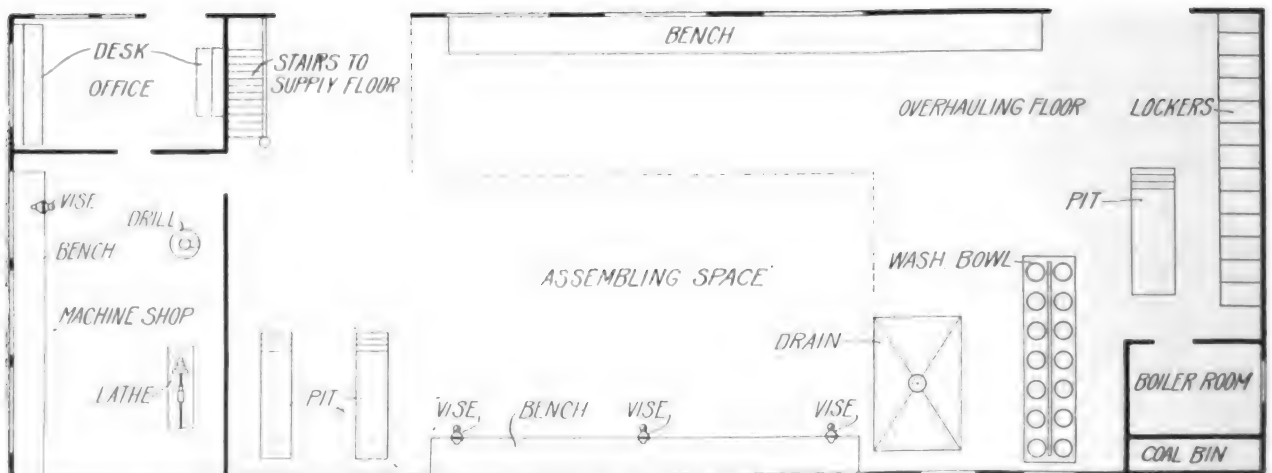


Fig. 1.

the cars may be taken from the one floor to the other and these are expensive.

In laying out the repair conveniences, there should be places at the sides of the pits, about two feet from the bottom, to support a board that may be moved from one end of the pit to the other, as a seat for a workman. For the motor truck it will be well to install a larger and shallower pit, as the mechanisms of these vehicles are carried higher than in the pleasure car. Such a pit should be about three and one-half

the amount and character of the work to be done. For assembling there may be several strong wooden horses, plenty of large blocking, and engine stands mounted on wheels, on which the motors can be placed either right or wrong side upward when working them out of the chassis frame. Strong lifting jacks and chain hoists save much lifting, and a potash kettle makes cleaning small parts easy. Where a good deal of overhauling work is done, an electric or compressed air drill can be used to advantage, and a ratchet drill

will serve to drill holes in inaccessible places in which the electric drill or hand operated drill press cannot be used. A supply of clamps will be found useful for floorwork as well as in the machine shop, and a variety of angle plates can be used to advantage with ratchet drills. A small truck saves much lifting and carrying. The gasoline blow torch is useful in heating soldering irons, for loosening parts tightly rusted together, and for other purposes where a hot flame is needed. In many repair shops a plumbers' kerosene torch is used in heating soldering irons, but it is not as useful as the lighter gasoline burner, which is more portable and can be worked in almost any position. Many other time and labor saving appliances will suggest themselves as the business becomes better established.

Fig. 1 shows the main floor plan of a one-story

the machines can be run directly back into the overhauling department, or ranged along the walls of the assembling room. A short passage leads from the small door at the side directly to the machine shop, though all entering must first pass the office before gaining admittance to the other departments. The plan shown is where the building is located at a corner, or where there is a short street at either side.

Fig. 3 shows a plan of another shop which scarcely needs further description.

Tool room, office and machine room may be arranged about as shown. The tool room is effectually separated from the machine room, and yet all that goes on in either room can be seen by the superintendent when in one room or the other. Two partially open partitions extend the width of the tool room, the one separating it from the passageway, the

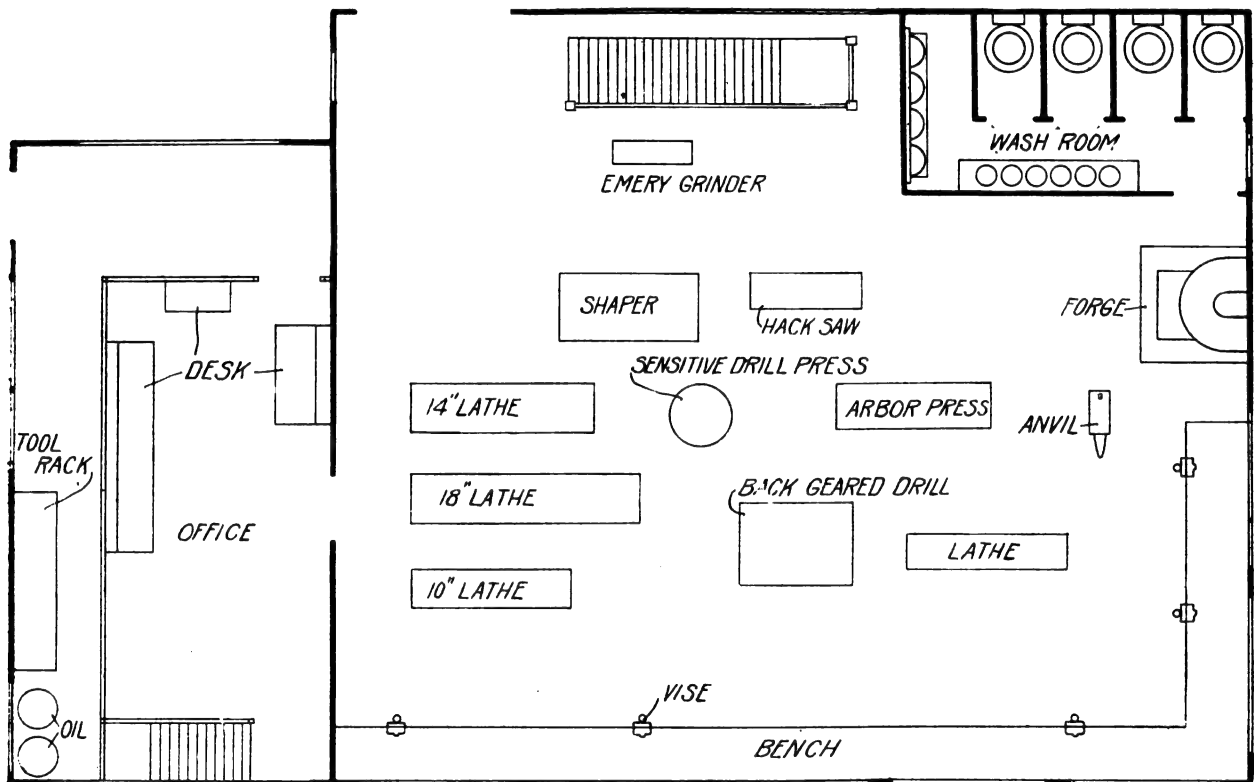


Fig. 3.

structure with a two-story frontage, Fig. 2, the whole having a capacity for 30 cars. The building is about 120 feet long and 40 feet wide. The front apartment is about 40 by 20 feet, which is again divided, the tool room and office being 10 feet wide by 16 feet long, the machine room about 30 feet wide and 20 feet long. The rear of the shop is partly divided by a partition extending 15 feet from the right wall, and about 20 feet from the rear wall. The right back corner is partitioned by a brick wall into a room about 15 feet wide by 10 feet deep, for boiler room for the heating plant. The space between the front and back portions, about 80 feet, is used for general repairing, for taking cars apart and storing cars ready for delivery.

The ground floor has a tool room and office, the machine shop, the assembling room and the overhauling room. The second story is about 25 feet deep and as shown at Fig. 2 is divided into three parts, a stock room with 15 feet frontage, a battery room 10 feet wide and a tire repair room the same size as the stock room. The entrance for cars is at the side of the building, and the door opens into the large room that

other from the machine shop. In each partition is placed two windows. Along a portion of the side wall and under the stairs are tool racks, while the smaller tools, such as drills, taps, dies, reamers, etc., are carried on revolving racks.

The bookkeeper and clerk share a desk ranged along the side wall, while the stenographer has a typewriter desk between the two windows. This makes it possible for the stenographer to wait upon customers applying at either window. The one nearest the door permits a visitor to talk with either the clerk or bookkeeper, while that at the other side of the desk allows the caller to talk to the superintendent or manager, whose desk is conveniently placed so that he can look into the shop.

The stock room is over the office and tool room, and a dumb waiter as well as a stairway connects both floors. At Fig. 4 is shown a rack for storing small parts, this having lower bins of larger size for bulkier articles, Fig. 5, a combination rack for stock, and a place, Fig. 6, to store sheet stock as well as other and less bulky articles. A practical form of rack for

bar iron and steel, tubing, etc., is at Fig. 7, this being a series of cast iron members joined by through bars, so coupled as to act as braces.

A well equipped automobile shop should have enough standard tools to do a good job at a reasonable cost on all work received, and to be able to restore any defective part that can be repaired. If the location is in a city or town where there is a well equipped general machine shop it is better to send out the occasional job that is beyond the capacity of the shop machinery than to tie up capital in machinery seldom needed.

If the repair shop is properly equipped in it may be done sheet metal and blacksmith work as well as regular machine repairing, but these are, of course, trades in themselves. There is much sheet metal work in connection with automobile repairing, and repairs on lamps, mudguards, tanks, radiators, sheet metal bodies, underpans, tubular manifolds, hoods, tool and

PNEUMATIC TIRES.

Some of the Attempts to Find Substitutes and How They Have Succeeded.

It was here stated some five or six years ago that nothing will ever quite take the place of the pneumatic tire. That there may be substitutes may be admitted, and some of them will have advantages of economy, or durability, but these will always be at the expense of a certain amount of resiliency and weight.

But as nothing exists and nothing can be made as cheap, as indestructible, as light and as resilient as air, so nothing can exactly take the place of confined air for wheels to turn on. Of course pneumatic tires are expensive and short-lived, but nothing can be conceived that more admirably fill the bill. And every attempt to make them more durable, other than by the best manufacturing methods and the use of the purest and best rubber, lessens their resiliency. For illustration, punc-

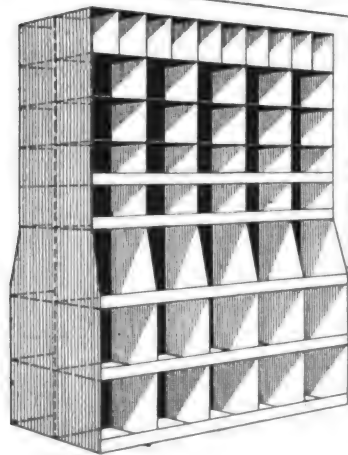


Fig. 4.

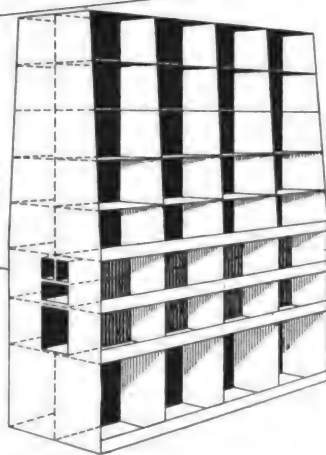


Fig. 5.

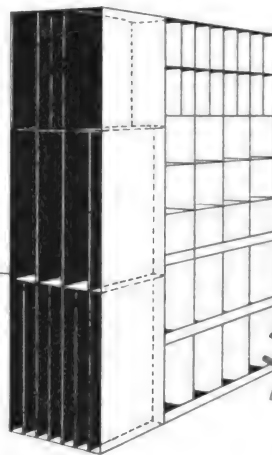


Fig. 6.

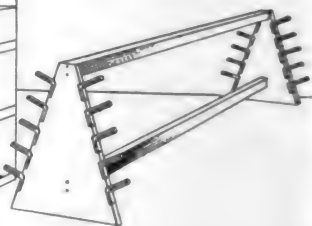


Fig. 7.

battery boxes, etc., in almost any medium sized shop will keep an expert tinsmith busy. A blacksmith will find plenty to do, in hardening and tempering, as well as forging and brazing, and all around men who can dress a tool or forge an intricate fitting with equal facility, can be secured at but little higher wages.

It is useless to go into details concerning machines and tools—of lathes, drilling machines, millers and shapers. Let the owner get what he thinks he may most need, and the kind he most needs. Of course, the lathe is important. Then, for blacksmith work, which will be frequent, there should be one, and better, two, forges, a small one and a large one.

The main thing is to give the comprehensive idea. Details are of less importance. Of course there should be power, and for this there is nothing as cheap as a gasoline engine of ample horsepower to carry all the machinery easily.

It will help prolong the life of your tires if you give your pump a few strokes before attaching it to the tire valve. This prevents any dust that may have accumulated in the nozzle from getting into the tire.

The magneto plug operates best with a small gap. This should be about .015625 inch, but it may be increased in time by the action of the heat. Sometimes erratic running of the motor at low speeds is due to irregular spark plug gaps. They should be uniform.

ture-proof pneumatic tires can undoubtedly be produced, but it will always be at the expense of their resiliency. Yet the loss in resiliency does not necessarily equal the gain in durability. Besides, gasoline is cheaper than rubber, and many automobile owners prefer to be shaken up just a bit rather than to pay out a good deal of money for the easiest riding pneumatic tires.

Thousands of patents have been taken out in relation to tire protectors, cushion tires, tire fillers and spring wheels. A few of them are now on the market but a large proportion have never been put to practical use, or, having been thus used, have been found undesirable in one respect or another. Just now there seems to be what may be called a "renaissance" of tire fillers. Whether they are to ever come to extended or common use or not is doubtful. If the pneumatic tire is found too expensive for the ordinary car owner he can be supplied with cushion tires, which, of course, have fillers of rubber, and rubber itself is both resilient and durable. In fact we have wondered why some enterprising manufacturer had not made a cushion tire with the filling comprised entirely of sponge rubber. This is surely extremely resilient and it ought to be durable. However, this is not to suggest where the brightest and most scientific minds have been studying for years, but merely to state just what has been done and the results.

At present there are two distinct classes of tire fillers, one a vegetable composition which has been vulcanized, and the other a combination of glue, glucose and glycer-

ine, a composition much like printers' rollers. This, however, is applied in a particular manner, as the company manufacturing it holds no less than eight patents upon the process.

One of the manufacturers of the vulcanized vegetable oil filler makes no secret of its base, it being the manner in which this vegetable oil is vulcanized that is the important feature of its manufacture. The only thing that the manufacturers will state is that the mass of oil used is heated and vulcanized gradually and homogeneously until the desired result is accomplished. It is quite resilient, and has an odor much resembling oil. There appears to be no moisture within this compound and it is said that it will not absorb moisture. It is molded in cylindrical form, enclosed in a cotton covering and is placed in the casing by pressure. As it contains no rubber it is said that the compound cannot harden or soften, but remains continually in the same state as when it is first placed in the casing, which, of course, is doubtful.

Another and a quite different composition, is placed in the tires in the same manner as when they are pumped with air. It is a patented compound of glue, glucose and glycerine manufactured in the form of a liquid by special machinery, but within a short time it becomes an elastic solid substance that will not again become a liquid or lose its elasticity, it is claimed, under any changes of temperature. This is forced into the inner tube through the valve, resulting in a complete filling of the inner tube with the liquid, which soon changes into a resilient substance. Tires are filled with this substance at various pressures in accordance with their size and the weight they carry and when the proper pressure has been reached, the valves are closed so that in a few hours the fillings are set and the tires are ready for use.

Demountable rims are particularly convenient for use in connection with these tire fillers and it is reported that a new rim will soon be placed upon the market, by the use of which a filled tire can be put on and taken off as readily as a pneumatic. This rim is further provided with an adjusting feature which allows the operator to make the rim wider or narrower, as occasion may demand, so that should the rubber of a shoe stretch through wear, or should it be an old one, the tire may be made smaller at its base so as to compress the filler, thereby serving the same purpose as adding more air.

In the case of another tire filler, although the base is composed of vegetable oil, it has in its composition rubber and other chemicals manufactured by a secret process, which is designed to give an unusually great amount of resiliency and wearing ability to the tire. This filler, it is said, contains approximately 10 per cent. of Para rubber. Another feature of this filler is the fact that when tubes are discarded and replaced by the filler, there is a somewhat different mode of procedure from some of the other types. It is molded into different sizes to fit various casings and it can be changed from one casing to another if desired. The process of application is a simple one, and is carried out by removing the wheel, if possible, and taking off the casing and discarding the inner tube. Provided the outer shoe has no weak places, in which case a reliner should be used, a sufficient amount of the punctureless filler is placed in the shoe to fill the space. The idea is that when the casing is again attached to the wheel, it will be contracted to a certain extent and the filler will occupy all the room in the tire without any danger of bursting. The casing may then be placed on the wheel, the tire bead is returned to position, and a special locking ring is laid upon the head and clamped down by the clamps furnished with the material until the locking ring can

be forced into its proper groove. Wheels can also be equipped without removing them from the car if the car is jacked up sufficiently to allow easy access to all sides of the wheel.

Another vegetable product as a filler has no rubber. In appearance, it is of a reddish brown color and it is made by a secret process. It is made in circular form and in varying diameters for the different size casings, and covered with fabric, which is left in position when the filler is placed in the casing. It is placed in the tire in much the same manner as the process of equipping a tire as described above and fully as elaborate claims are made as to its efficiency.

In the case of another product the manufacturers base their faith in a vulcanized vegetable oil. This has the appearance and quality of rubber, but it is said to possess the advantage of not depreciating with age and of remaining efficient under all conditions, and this last claim may not be strictly correct. This filler must be compressed in the casing, and like air, the more of it that is used in the casing the harder the casing will be. This filler is inserted by removing the casing from the wheel, and taking out the inner tube, after which the hole in the rim where the valve stem was placed should be plugged up. The filler is then inserted in the same manner as the other vegetable oil products, and the casing is replaced upon the wheel by means of clamps, as before described.

A type of filler is also made of a semi-liquid form which is run into the tire and allowed to solidify. This is a preparation which is run into the inner tube while the tire is on the wheel, or with the tube in a mold. This filler solidifies in a few minutes and does not afterward reduce itself to a semi-liquid state, being unaffected by heat or cold. It is made principally of animal matter with a small amount of chemical to prevent remelting. It has much the appearance of rubber and can be changed from one casing to another by means of special clamps.

A St. Louis, Mo., firm is manufacturing a compound which is said to take the place of air which is made by a secret process. This filler can be placed in tires on the rims of wheels at a plant equipped and operated for the purpose, and users generally find it to their advantage to ship their complete tires to a station for equipment in this manner. The product, it is said, will withstand any amount of heat or cold.

There are other fillers upon the market which have met with more or less success. Although there is scarcely a motorist who is not prejudiced against air, the very fact that air has been so widely used makes it a difficult matter to induce a motorist to use any other product, no matter how meritorious it may be. The manufacturers who are in business at the present day, although not attempting to do business upon a large scale, owing to the limited facilities at their command, appear to have all the business that they can handle, and a large number of satisfied users. It is the hope of many motorists and the firm belief of the advocates of tire fillers that the puncture problem has been to a large extent solved, and the much more extended use of tire fillers is confidently expected.

Whether any of them are as resilient as air and as unchanging and durable as air, may not be denied with confidence. No one who has not given them a fair test knows. But in any event, there is surely nothing as light as air and as cheap as air.

It may be remarked in passing that the tendency of some manufacturers of tire fillers to sell territory to agents rather than to sell the tire fillers directly to the

users, does not increase the confidence of the average car owner in the reliability of their product.

Rights of the Road.

From C. L. VonBerg, Pennsylvania.—That the automobile has equal rights on the road with other vehicles has been settled, and as most of our machines are used for business rather than pleasure, they are entitled to these rights all the more. It would be an ill-disposed person who would not stop his machine when he knew it meant a runaway team, not knowing what loss of life and property might result.

On the other hand, to send out a fractious horse, poorly harnessed and in the hands of an incompetent driver, that a piece of paper as well as an automobile would cause to run away, would make its owner holden for damages done.

When bicycles first came out, horsemen forbid them the right of way. Today, these same horsemen use bicycles and expect equal rights, and they get them. When traction engines were first used, many thought they had no right on the highway. These same men are owning them now, or having work done by them, that they could not get along without. The automobile has come to stay and is owned by some of the best horsemen and farmers in the country. What one reckless driver does, other auto owners should not be blamed for.

A few suggestions that have proven good will be of use to both auto drivers and horsemen who want to pass safely and quickly and yet do not understand the shortcomings of both horse and machine.

Both drivers should keep a sharp lookout ahead at all times, expecting to meet machines or bad horses. The worse the horse the more watchful should its driver be. No tugs too long, poorly fastened or poor pole straps, which are worse than poor lines in many cases. Sleeping drivers should not be permitted (and what car driver has not found a sleeping driver?) Neither should the driver get worse scared than the horse, who becomes frightened by seeing his master so, rather than at the machine ahead. Blind bridles have caused more accidents than any one thing about a harness; if a horse can see the machine coming behind him he will not be half as hard to control and a word spoken to him calms him better than anything else. Let each turn to the right as far as the condition of the horses seem to need. So much trouble can be saved if horses are turned well out, so that they can know that they can get by, and then keep them moving, rather than let them stop and spread and back. There are times when a horse can't be made to go and an auto must stop, but nine times out of ten, if both are well turned out and kept moving slowly past, it is far the best. When you make a car driver stop remember it sets him back from one to two miles; perhaps a dozen others have stopped him the same, not making any effort to prevent it. He could make a train's speed with a clear road, but in this way is held down to that of a buggy. Does any one wonder he shows some signs of temper when the man with a plug team, "takes the law in his hands," or holds up his hand as a signal to stop, before the auto is within 300 yards of him? It only means a delay of five or ten minutes to the team every time he meets an auto, but if this time is spent in passing every team it means over an hour's loss of time, on most short runs he makes as he meets and passes double the number of teams a buggy would on account of going that much faster.

Nothing helps getting good roads like the use of automobiles. It interests men who have the means to make

road improvement. Good roads mean more rural free delivery routes, less loss of time and money to the farmer for marketing and a higher state of improvement all round.

This is a progressive age and we must keep pace with it. Auto builders and owners have gone through a trying experimental stage and after squandering thousands of dollars, are now able to make a machine that does work impossible for a horse. To these men and the early enthusiasts who parted with their money in fabulous prices for crude machines whose gasoline smell was their strongest feature, the public owe at least, recognition.

Trade Paper Advertising.

R. R. Shuman, before the National Advertising Association at Dallas, Texas.—I have seen some wonderful results of advertising in trade and technical journals. I have seen a soda fountain house in fifteen years rise from a position of obscurity to a point where it is the largest firm of the kind in the world—a period of fifteen years during which practically all the advertising done by the firm was trade journal advertising—a period during which the firm created soda fountain advertising as it now stands by setting the pace.

I have seen a steel company quadruple its output of galvanized sheets in 18 months' time, make its name and trade-mark known as a familiar word to users of the product in every city, town and hamlet of the country, and establish so high a reputation for quality that the price secured averages considerably above the price secured before the advertising began, as measured by current market quotations.

I have seen a manufacturer of hosiery get 1,100 new retail merchants' accounts at an expense of \$4,500, and those 1,100 merchants in one year's time have expended, in the aggregate, \$15,000 of their own money in their local newspapers for advertising that manufacturer's goods.

I have seen a contractor get \$8,000,000 worth of new business in a year's time at a cost of \$4,000, in double pages, in only five trade journals.

I have seen a German manufacturer of dye stuffs make his name as standard in the stores and in the homes of the United States by the use of no other advertising than trade journal advertising.

The buying-power of five thousand readers of the average trade paper is greater than that of five hundred thousand readers of the average consumer medium. And the advertiser who will but avail himself of the privilege of winning the acquaintance and the confidence of these men through their own business journals will find a new and signal solution to the increasingly difficult problem of getting efficiency out of his advertising outlay.

Claim They Save Power.

The Motz Cushion Tire Company claim that many owners of light commercial cars do not realize that on a given charge of fuel their cars will travel farther when equipped with Motz Cushion Tires than with either pneumatic or solid tires. They say it makes no difference whether your car is electrically driven or gas driven, or what kind of light delivery duty it performs, or where you drive it, you will consume the least amount of power when it is equipped with Motz Cushion Tires. Each set is guaranteed for ten thousand miles—two years.

ENGINE REPAIRS.

It Pays to First Be Sure You Are Right and Then Go Ahead.

From H. L. Chapman, Michigan.—The expert repair man is all right if he really is an expert, but there are a lot of fellows who have had a little experience with one engine only, and at once they set themselves up as "experts," and of course always have a remedy for every wrong. Like some doctors who have less than ordinary ability, after a three years' school course they are ready for practice, and know just what remedy will relieve every trouble, although they may not be able to give a reasonably close guess whether their patient has the colic or rheumatism. They must do something to keep up their reputation, however, and so try an experiment, and if that fails of course they try something else, until finally they either kill or cure.

So it is with many alleged engine experts. An engine about five years old came to my shop for repairs. It was a four and one-half horsepower, four-cycle, engine with make-and-break igniter, and was water-cooled so far as the cylinder was concerned, but the head was only water-cooled by a small pocket on the side opposite the valves. It was $5\frac{1}{2}$ -inch bore and 10-inch stroke and ran at 425 turns per minute. It was used on a small farm for pumping water, shelling corn, grinding feed, cutting fodder, and sawing wood as required. It was strongly and well built, but any one who understands engine economy will see at once that it was not an economical engine, for the piston travel was a fraction over 708 feet per minute, while some engines having only 5-inch bore and 6-inch stroke and a piston travel of 475 feet per minute give strong five horsepower, while using about one-half the amount of fuel. This is a feature every prospective purchaser should look after very closely, for engines on the market today vary in fuel consumption all the way up to 125 per cent., which means that some engines require \$2.25 worth of gasoline to do what others will do with \$1 worth. Although the engine referred to was stationary, the same conditions apply to automobile engines.

But I have strayed from the subject. This engine ran very nicely for something like three years, when for some unknown cause it began to lose power, and an expert was called who made some adjustments and pronounced it all right. Still it did not pull and he was called again. Failing to fix the engine, he pronounced it a case of leaky rings. Another expert was called and he succeeded in causing it to run a little better for a time, but not up to its former power, and fully a half-dozen were called one after another to repair it, but it constantly kept getting worse, until finally it refused to start. The owner had been trying to save money by getting an "expert" that would do the work at a rate of \$2 to \$2.50 per day, rather than pay an experienced man at the rate of 60 cents an hour. But now the engine was dead, and the "experts" could find no means of a resurrection. So the engine was finally brought to me.

On turning the engine over I saw at once there was no compression and that it was leaking by the valves. We took them out and ground them in and we also found there was a leak between the valve casing and the main casting but it was so constructed that it was impossible to re-grind it to a seat. We used a copper gasket, making it tight. Then we turned the engine over again and watched the timing of the valves. We found some one had taken off the reducing gear and

placed it back so the exhaust valve closed at about 80 degrees before the crank reached the inner dead center on the exhaust stroke, when it should have been open until the crank had passed the dead center from three to five degrees.

You see the gears had been "experted" out of place, or out of time. This adjusted, we turned it again and watched the timing of the spark. We found it gave the spark at about 30 degrees above the dead center on the working stroke and tried to adjust this but found that some one had "experted" off about $\frac{3}{8}$ of an inch from the igniter trip rod and the bolt on which the rod was hung had been changed and was too loose to give anything like accurate timing. We went to the forge and drew out the igniter trip rod to proper length and made a new bolt for it, getting it to trip the igniter at about 12 or 15 degrees in advance of the dead center, so the gases would be burned by the time the crank was on dead center.

We then thought it should start, but soon found we could get no spark, and taking off the igniter we found it short circuited through the igniter insulation. A bolt was used for the insulated pole of the igniter and it was wrapped with one thickness of asbestos paper. As there was only 1-32 inch space around it for insulation and it had two mica washers to prevent the head and nut striking the body of the casting, we turned the bolt down and used a mica tube 3-32 inch thick and two washers as before. It was then placed on the engine and tried with a little gasoline in the priming cup. It made two explosions and stopped. We tried again with the same results, and then discovered that there was water at the mixer valve. The pipe was disconnected and two gallons of water and about one gallon of gasoline drawn out.

I have known of people using a very small spray of water direct into the cylinder to get the advantage of the expansion of the water as steam, but I have never known of its being used in the tank successfully; at least there was too much water and not enough gasoline in this case.

This fixed we tried again and it would barely run. Some one had placed a reducer in the mixer valve to increase the suction. Probably this was done by some one trying to make it run on water, as they certainly did not get any gasoline to the mixer. This adjusted, we started the engine. It speeded up to about six or seven hundred per minute and locked up and stayed locked up until the engine stopped. Some "expert" had found the governor weight in the fly wheel was loose and of course it ought not to be, so it was tightened up to stay. This having been remedied, we found the governor lock lever had been bent so the engine would lock up before it would start. We straightened this to allow it to run without catching, until the governor began to act on it, then adjusted the spring to give the rated speed, and the engine ran all right and carried just a trifle over $4\frac{1}{2}$ h.p. load at the belt.

With an experience of more than a hundred similar cases, it is my advice to engine owners, when anything bothers them, to go slow, and study every part of the engine carefully and follow it through with the instruction book and learn just what each part is for, and nine times out of ten they will be able to find the trouble and many times will not need to even use the wrench to fix it. Do not allow some "expert," so called, to take the engine apart; better get a good man, one who is practical, and have the work done right.

To illustrate: I was called to make a 14 mile drive to fix an engine that "just would not start." I found

the battery wire was of the lamp cord kind, having about 18 small wires inside the insulation, and in placing these on the insulated pole of the igniter, three or four of these little wires had become separated from the main wire and had come in contact with the main casting. I saw at once that the battery was short circuited and in about one minute I had found it and showed it to the owner. Then I took a pencil out of my pocket and sprung the wires out of contact and the engine started the first time over although the batteries had been in contact enough to run them down very low. This was a 14 mile drive caused by a wire about 1 inch long and smaller than a No. 80 thread.

It pays to think, to study your engine, to know when something is wrong, and be able to find out what it is, and then to apply the remedy.

WHO CAN AFFORD A CAR?

How Much Income Should a Man Have to be Able to Own One?

The above are questions that have not yet been answered with authority and it may be some years before they can be. But here is the opinion of R. C. Hupp, and although he is a designer and manufacturer, he treats the subject fairly and ably:

"To my mind the question of a man's income does not enter into the question of whether he should buy an automobile. Who ever heard of a man being extravagant because he owned a horse? As far as I know, a man always bought a horse because he needed it, and because it was a profitable investment. Why, an automobile should be purchased for any other reason is a mystery. A millionaire who purchases a high priced car and has a chauffeur should do so because it is a profitable investment. Usually a millionaire's time is worth money, and the automobile pay, and therefore they buy them without any paid for by the saving of time and the luxury and convenience are procured for little or nothing extra. If the millionaire's car did not save him anything it would be just as extravagant for him as it would for a poor man to buy a car which did not bring a return on the money. Men of all classes, no matter what their income, buy automobiles because they need them and because they either save them time, or actually have a profit returned by their use. Salesmen, contractors, physicians, farmers and every class of men who have to go a great deal can make an automobile pay, and therefore they buy them without any mobile pay, and therefore they buy them without any particular consideration of what their income may be. In other words, the great majority of people who are using automobiles increase their income thereby.

"An automobile is purchased for identically the same reason that the horse has been purchased, but it is more economical than the horse on account of the greater territory that can be covered in less time. The low priced automobile today is cheaper to own and operate than a horse has ever been. There are hundreds of thousands of people today who should have an automobile, that would be a money saver for them, if they would only sit down and figure it out, but the consideration of how great an income a man must have to own a car deters many from making an investigation, and when automobile manufacturers themselves insist on discussing the matter from this angle it certainly isn't strange that the people who

need an automobile and do not have one should be looking at the matter from the same standpoint.

"I have been connected with the automobile business from the beginning, have been associated with the companies producing the largest number of cars, and therefore have been able to meet and talk with thousands of owners of cars. A man who owned an automobile and did not make it a profitable investment was rare indeed, and the few exceptions that came under that head soon sold their cars.

"It is a positive fact that the light car of today, and this covers the whole class selling at less than \$1,000, are being operated at a cost of about \$10 per month on the average, where the owner takes care of his own machine. The light American cars, such as the R-C-H, weighing, completely equipped and filled with water and oil, 2,400 lbs. or less, using 3½-inch tires, are averaging 10,000 miles for each \$100 tire expense, or, in other words, one-tenth of a cent a mile. The cost of repairs varies with drivers. The careful driver, looking after his own car, has very little expense in this regard, and \$50 for each 10,000 miles would be a liberal average on the cars of this class. Allowing 6 per cent. interest for a man's investment on a car at \$1,000 amounts to \$5 per month.

"It can therefore be seen that an automobile could be driven 1,000 miles a month at an operating expense of \$10, which includes \$7.50 for gasoline, \$2.50 for oil, figuring twenty miles to a gallon of gasoline at 15 cents per gallon. Then allowing for tire expense, \$5 repair expense and \$5 interest expense, the total would be \$30 per month. The above expense would operate a 2,000- to 2,400-lb. car carrying five people. Lighter touring cars could be operated for less and runabouts for a still smaller amount.

"I am told that a horse is not expected to cover over 20 to 25 miles a day and that he cannot be fed, shod and doctored for less than \$25 a month. So it will be seen that a horse and single wagon costs more to operate than a five-passenger automobile, and that a two-passenger automobile is far cheaper. It is also a fact that if a horse were driven twenty-five miles every day in the month, including Sundays, that he would very soon give out, whereas an automobile is untiring.

"I therefore maintain that an automobile is the thing to own, for a man who can make it a profitable investment either as a time saver or a money saver. The man who cannot make it a profitable investment would be extravagant if he owned one, whether he was a millionaire or whether he had a very small income."

Testing an Automobile.

One motorist who delights in rather than objects to bad roads is the automobile tester. To the citizen of the city where automobiles are built the tester passes by without much attention, but to the visitor from the districts where motor car manufacturing is not established the men who try out the cars are always a source of great interest. The automobile to the tester is as the broncho to the cowboy, and it seems as though the testers call upon their machines to do about as many feats.

It is the tester that takes the complete chassis sent to him from the assembly department and works it into a smoothly running unit. If there is a fault in construction, material, adjustment or workmanship, it is up to him to find it. To do this he relies upon bad road conditions. To the tester a sand stretch, steep

hill or muddy length of road appeals most strongly because it gives him a chance to test the car. Especially severe is the road test given the R-C-H cars. About four miles from the factory there is a strip of sand road that would strike terror to the heart of the average motorists. Putting a car through this is one of the hardest features of the test. Through this strip of seemingly bottomless sand the R-C-H testers take their cars. First they take it on the run on high gear, going through the entire length without shifting if possible. They then come back and deliberately stop in one of the worst spots and give the car the task of pulling out of the sand. At first the sand flies in clouds as the photograph plainly shows. A slip would mean the landing of the car in a ditch far below the road level. It is dangerous, exciting and



Plowing through the sand.

strenuous but it is all in the life of a tester and the supreme test for a chassis. It is far more strenuous than any car would be called upon to do to anything like ordinary conditions, but its extremeness makes it more efficient. Every R-C-H that goes out must be able to negotiate this sand strip under all conditions. Then and not until then is it given an O. K. and when the car is tuned up to this point and turned in by the road tester, it can be depended upon to deliver the goods.

Value of Advertising to the Motor Car Industry.

From Reader, Maryland.—Advertising is the highest typification of intensive salesmanship and where you find intensive salesmanship you will find products and prices that are on as true and equitable basis as possible. This applies with particular emphasis to the automobile industry.

I believe that advertising plus scientific management has made possible the phenomenal growth and production capacity of this industry. I believe that Henry Ford can no more market an output of some 100,000 cars annually and give the value that they contain without advertising them, than he can operate without efficient help and modern mechanical equipment.

When we come to the accessories' division its value is doubly important. Take one specific line—automobile lubricants. Automobile advertising tells the motorist vital facts on lubrication that he very seldom looks at in the booklets of instruction that every

car maker distributes as a part of his service. He is interested in this or that particular oil, just as this or that particular oil advertising carries in its make-up sterling truths and facts. An advertiser must live up to his advertising. He has put himself on record before the world. He has much to lose in marketing inferior oils. The non-advertiser has nothing at stake. Advertising helps make the price of lubricants possible. It enables the manufacturer and refiner to secure a distribution that covers every corner of the earth. It can accomplish in six months what it will take an army of flesh and blood representatives several years to bring about. The missionary work that advertising can do, breaking of the ground, lifting from the salesman's shoulder the rough and gruelling work is very much undervalued. It gives him just that much more time to develop his finesse and strategic ability in the closing of sales.

AIR COOLING.

Mr. Duryea Returns to the Subject and Points With Pride.

From C. E. Duryea, Michigan.—Your comment on page 61 of the June issue in reference to air cooling is very complimentary, for which I am duly thankful, but you ruined the force of the argument by stating that "some water-cooled adherents might argue that there is nothing gained by having the walls hotter than 212 degrees." There could be no truth in such an argument, and I do not see the force of making it. Everybody ought to know by this time that the gas engine is strictly a heat engine, depending solely upon heat for its power, and not upon the production of gas from a solid or liquid as would be true if gun powder were used. The combustion produces water vapor and carbonic acid gas, both of which take less room, and have less volume than the original oxygen and gasoline vapor from which they are produced, so if there was no heat there would be no pressure. Anyone doubting this can readily make a simple test by fitting a toy balloon with an extremely minute pipe as an outlet. The balloon can then be partly filled with gas, which escaping slowly burns at the outlet. Over this drop a large bell glass into a pan of water. It is quite evident that the gas in the balloon and the air in the bell glass will unite just as they would unite in the cylinder of an engine, except that the gas burns as it issues instead of being mixed previously and burned instantly as in the engine. The same amount of heat will be generated but it will be absorbed by the bell glass and water instead of expanding with power as in the engine. When the combustion is complete the bell glass will be partly full of water instead of full of air and balloon, containing gas, as at the beginning.

Since the heating of the charge is the only working element, that engine which is most economical of its heat requires the least fuel for a given power, and since it is manifestly impossible to use that heat for the boiling of water and also for power, it is self-evident that the hotter the engine is run, the more economic it will be, other things being equal. This is easily proven by a test which my own workmen have at their suggestion applied. They believed that our water-cooled engines ran too hot and that they would develop more power if kept cooler, so the following test was made. With the engine running on the testing stand and with Prony brake in action, the power was carried up to maximum with water boiling. The water jacket was then connected with the source of water supply and

cooler water turned on slowly, with the result that the engine lost power and could not carry its previous load. Suddenly turning on the water would stop the engine dead, possibly because the cylinders contracted upon the expanding pistons tightly, but the demonstration was so complete that the workmen who saw it no longer had any arguments in favor of cooler engines. It is well known that air-cooled engines win the economy tests, and this is done with such certainty that economy tests are not popular.

We use oil having a fire test considerably above 700 degrees, or about 200 degrees higher than the best oils commonly used. We believe our engines run with the compression space walls as hot as 450 or 500 degrees, so that the temperature is over 200 or 300 degrees, and possibly 400 degrees higher than water-cooled engines run. It is certainly evident that such a hot wall will not be heated by compression of the fresh charge for the heat of compression is not this high, and a hot wall will not carry off heat so rapidly from the burned charge as will a water-cooled wall, which is never higher than 212 and generally 160 to 180 degrees. Roughly speaking, the usual wall temperature is 100 degrees above the atmospheric temperature, while our air-cooled motors run with temperatures 400 to 500 degrees above atmospheric.

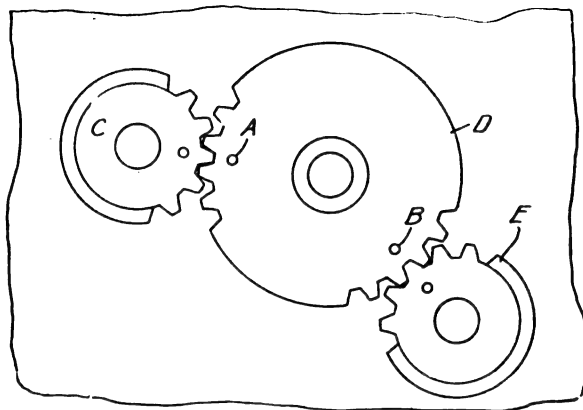
This not only saves heat on the inside, but it saves much cooling surface on the outside, for it is certainly evident that a piece of metal 500 degrees hotter than the air, will throw off heat five times as fast as a piece only 100 degrees hotter, and will, therefore, require only about one-fifth as much radiating surface.

Not only is there a gain in economy and in simplicity of cooling means, but there is a gain in action. We, like everybody else, are limited as to compression pressure and temperature by the danger of pre-ignition, so we rate our motors low, and do not work them to their maximum. In other words, for a given duty we provide a slightly larger motor and use a lean mixture. This lean mixture requires a higher heat or a higher compression to make it self-ignite. We have the high heat so we use low compression and as a result of the large firing chamber and the hot walls, our pressures hold up well with consequent good power down to the end of the stroke. This means a more noisy exhaust with consequent need for good muffling, but it gives an engine which pulls like a steam engine and is as well adapted for hill climbing or hard work, as is often found. The combination cannot be beaten, we believe. We know that many users and designers think the best motor is the one which gives the most power from a given bore and stroke, but we do not believe this is true. By using lower compressions we can work with lower pressure and consequently with lighter construction, so that the slightly increased size does not necessarily add weight. Further, for short spurts we can make the mixture fatter by adjusting the carburetor and until the engine gets quite hot we can take out more than the normal power. This adds a flexibility which a smaller motor would not have.

Valve Timing.

Do not overlook the importance of correct valve timing. In case the engine does not behave as it should, see that the valves open and close as they should. In the taking down of the motor, since the halftime gears have to be unmeshed, workmen sometimes forget to mark the meshing teeth in the manner as shown in the illustration, by means of spotting with a tool at A for the magneto gear, and B for the halftime gear, and when the motor is reassembled

they use their imagination, hoping that they will arrive at the proper meshing of the teeth, but the process is futile. The gears should be properly marked before the teeth are unmeshed, but if this is dispensed with and the motor performs in an ugly way after it comes back to the owner from the repair-shop it will remain for him to investigate the setting of the gears and the timing of the magneto, when, if he finds that the teeth of the halftime train are



Plan of the gears.

wrongly meshed, he will have to remesh the gears to accord with the needs, and it is suggested that he take a spotting tool while the opportunity affords and do the work that the repair man is in duty bound to do. In the illustration, C is the magneto gear, D the cam gear, and E the crank shaft gear.

FAULTY CARBURETION.

How to Adjust the Carburetor and How to Know When It Needs Adjustment.

From J. T. Lansing, Massachusetts.—Probably the most common or one of the most common troubles experienced with present day automobile engines is faulty carburetion. The cause of this is usually improper carburetor adjustment. This results in the engine being fed a mixture which is either too rich or too lean. If the former is the case, black smoke will usually be in evidence issuing from the exhaust. Care should be taken to distinguish this from the excess of blue smoke which is indicative of too much engine lubrication. Whenever any considerable quantity of smoke of either color comes from the exhaust the engine may miss explosions due to fouled spark plugs. If the mixture is too rich, the engine will have a tendency to slow up and "choke" when the throttle is opened wide, and will run at a higher speed when it is partly closed. Another indication of the mixture being too rich will be shown in its speeding up perceptibly if the auxiliary air valve of the carburetor is held open or additional air is admitted in any way between the carburetor and the cylinders. Such being the case, the exhaust gases, if ignited by holding a piece of burning paper near the end of the exhaust pipe, will burn with a large red flame similar to that of a bunsen burner when the air is mostly cut off.

If the mixture is too weak this may be shown by "back firing" or popping into the carburetor. Both this and explosions in the muffler may merely indicate faulty ignition, however. If the mixture is too weak the engine may be speeded up by reducing the amount of air admitted to the carburetor and will slow down or stop if the proportion of air in the mixture be increased. The engine speed will be increased if gasoline be squirted

into the carburetor at the air inlet. When ignited, the exhaust will burn with a peculiar "smacking" sound or hollow pop rather than with a strong puff and the flame will be small and pale, almost greenish yellow.

The best way to adjust a carburetor is to arrange so that the engine may be run loaded while the adjustment is being made. One way to do this is to adjust the carburetor while the car is in motion on the road but few people find it convenient to make adjustments in this manner, and probably a very small proportion of users have the privilege of using suitable dynamometers for this purpose. Carburetors possessing air valves which are interconnected with the gasoline valve or arrangements for automatically varying the gasoline supply as the throttle is opened, differ so much in their individual arrangements that the only practicable course is to follow explicitly the maker's instructions. The writer found the following to be the best method of adjusting the ordinary automatic carburetor with which he is most familiar:

First, run the engine at what will be nearly its maximum speed in ordinary use with the throttle open considerably and the spark rather late. This speed, of course, will be considerably less than the maximum speed of the engine when running idle. Then turn the main gasoline adjustment until the mixture is so weak there is popping in the carburetor. Note this position and then turn the adjustment until so much gas is fed that the engine chokes and threatens to stop. Set the adjustment half way between these two points which will be very near the correct position. Turn the adjustment slightly in one direction and then in the other until the point is found where the engine seems to run the fastest and smoothest. Then slow the engine considerably and try lighting the exhaust gases. The flame should neither be red as when the mixture is too rich nor pale and small, but half way between the two extremes and of a rich blue color.

If the proper color is obtained slow the engine by throttling down to less than 200 revolutions per minute. Then gently and gradually cover the auxiliary air inlet of the carburetor by placing the hands over the valve if necessary in order to exclude the air. If the engine slows down the spring should be weakened since not enough air is allowed to enter the carburetor. Next try opening the air inlet slowly and gradually by pushing the poppet off its seat with the finger or the end of a pencil. If the engine speeds up there was not enough air and the spring should be loosened, while if it slows down the mixture is correct or a little too lean according to the degree to which the speed is affected. If it is found to be too lean the spring needs tightening. After the air inlet has been adjusted open the throttle again and adjust at high speed as this adjustment may now require to be altered. The lower the maximum speed for which the carburetor is adjusted the greater will be the fuel economy.

When adjusting carburetors for speed, racing, etc., the mixture is cut down much more than for ordinary use. One method is to cut off the supply until the engine misses when idling at low speed. Then give it just a trifle more and test the adjustment by trying the car on a hill. Some time ago the writer was told by an extester that whenever he was beaten in a "brush" he was in the habit of stopping and adjusting his carburetor until the engine missed. Then, in a good many cases he was able to catch up with and pass his opponent. Another method is to open the cocks in the cylinder heads while the engine is running and judge from the color of the flame when the mixture is correct.

STEAM CAR DEPARTMENT

This department is intended for owners, users and others interested in the steam car.

Those who have trouble with their steam cars are asked to give clear and full particulars, and their queries will be answered as correctly as possible by an expert. It will be considered a favor if our readers will contribute to this department, giving such information as may be useful to others using the steam car.

Steam Car Experience.

From Oakland, California.—I have for the last year paid special attention to the Steam Department as I have in that time been driving a White Steamer, Model L. I am not going to tell you that the steamer is the only car on the market worth having; that would be foolish, for I would by that say that among every 500 automobile owners can only be found one sensible man, and the other 499 being fools in not knowing enough to buy a steamer. I say every man to his own opinion, and let us respect the other man's. I like my steamer, it has given good service and as far as driving goes, I prefer it to a gas car, but taking everything into consideration, I admit the gas car is far ahead.

In regard to taking care of your own car, a man has to be more of a mechanic to keep a steamer in repair, and if you have your work done in a garage, you will also find it harder to get the steamer fixed, as most places will have nothing to do with them because they know nothing about them. I will say for the benefit of the stranger who should happen to come to Oakland in a steamer, we have here a place where exclusive steamer work is done, and all the men working there are experts on steamers, and if your car need fixing, they will fix it while you wait.

Above all things, if you have a car, whether it be a steamer or gas car, and desire to have some enjoyment out of it, get acquainted with your car; study every part of it so you know what it is for, so you can tell what the trouble is if your car takes a notion to stop when you want to keep it going. I have had two gas cars, and one steamer in three years, and although I have been stalled a good many times, I have always been able to find the trouble and fix it, and go home without help. My neighbor has a steamer, the same year's make as mine; his is in the shop a good deal of the time, and mine has not been there yet except what overhauling I do on it at home. Some time ago my neighbor and I took our families for a 600 mile touring trip down the valley and the whole trip would have been without any mishap except for my neighbor's ignorance about a steamer. After hand firing for three or four minutes under an empty generator he gave a few strokes by the hand pump, just enough to raise a little steam, then opening the throttle wide open and sending a full stream of cold water into the generator, it resulted in a split tube. This would never have happened if his engine had been started to turn over real strong or he had used the hand pump sufficiently before firing up.

On our return trip I had an experience which some other steam car man is liable to have, if he takes water from any old place along the road, as I did. My car was working splendidly all the time until at once the fire refused to come on. I thought first my water tank was empty; it was a little low, but filling it full did not help any. I tried everything possible; examined the checks in the water line, and found them O. K.; thought the piston in the flow-motor might be stuck, but found that in good order. It was now getting dark and over

60 miles from home. Something had to be done. My neighbor's car was in poor shape, he had all he could do without towing me, so I put my thinking cap on. I knew there was a cause, and that cause was somewhere and must be found, and after following the water line from the tank to the generator I could think of no other place but by the by pass valve, and sure enough, there it was. By using dirty water from the ditches some little obstacle had got under the valve and kept it from closing, so that it was pumped back into the tank instead of going through the flow-motor and to the generator. It was some work to take it out and replace it, but all was well as soon as it was done, and we went on our way rejoicing. My neighbor said if he could fix a steamer like that, then he would never want a gas car.

The water here is liable to form scale in the generator, but I have no trouble. I fill it full of coal oil once in a while, and leave that in as long as I can. I have an arrangement of pipes connected with the left hand blow-off valve, so I can blow all the water out by opening the valve on the right, and using my tire pump. When I want to remove the coal oil I connect the garden hose to the pipe and let the water run through full force for a while and a good lot of the deposits come out. Always keep plenty of water in your tank; never let it run empty while running, but flush it out whenever you have a chance. I ran short of water one night, and had to carry some from a ditch in my hat; now I carry a bucket with me.

More Stanley Kinks.

From S. G. Rich, Maine.—The ignorant or foolish repairman can cause a lot of trouble in a Stanley car by a few small errors. In one town there is a repairman who has the habit of replacing the balls of the pump valves on little provocation. This is well enough, for a scratched ball will allow leakage. But this repairman uses steel balls for this replacement. In a little while they rust, and the leakage is as bad as ever. The rust pits the seats and makes it impossible to get the pumps in order without re-facing the seats. Only bronze balls, such as the Stanley people use and supply are safe to use in this work, for they do not rust. It is probably advisable to use these same bronze balls in the gasoline pump. The big Stanley stage used on the Grafton Notch route, in Maine, gave a lot of trouble by not holding its water on hills, and was finally abandoned for horses just because of steel balls in the pumps.

On Stanley cars of about five years ago there is an auxiliary locking throttle and a try-cock on the dash. Neither is of much use and neither is fitted on the newer models. The pipe to the try-cock is in the way whenever there are adjustments to be made behind the boiler. Harvey, of Lewiston, Me., who is known as the best Stanley repairman north and east of the factory, makes a practice of removing these two fittings on cars that he overhauls. In place of the stem of the auxiliary throttle and the gland he inserts a plug. The dash looks cleaner and the other things on it are more convenient after this change. Of course the holes in the dash are to be plugged.

Harvey also makes a practice of putting some patent brake-lining on the bronze shoes of the hub brakes of these old models. The metal to metal contact wears out the shoes and they are not easy to replace. Lining lasts longer, brakes better, and is cheaper. I understand that the newer Stanley cars have lined brakes.

The addition of an electric gauge lamp, operated as

a flash-lamp from a button just below the throttle lever and of splashers on the inside of the fenders will go far to make some of the older Stanley cars more pleasant to drive. A small three-cell battery such as is furnished for some hand flash-lamps, and a tungsten lamp, make a good outfit. I connect to the battery by soldering the ends of the wires to it, and carry the battery packed in waste near the oil tank. The splashers can easily be made out of rubber cloth or heavy black oil cloth. They should be made of two thicknesses sewed back to back. They may be made either to hang down inside the wheel, as they are on some Stanley cars of about 1909, or to stretch from the fender to the chassis sills. They are most needed on the front fenders.

For plastering around the burner, ordinary asbestos flour is not very good. The Stanley people use a heavy asbestos paper supplied by the H. W. Johns-Manville Company of New York. This is torn into large bits and crumpled by hand in water to form a heavy fibrous paste. Just before using it, a little flour—ordinary kitchen flour—is thrown on it and mixed in. This mixture bakes hard and adheres firmly to the burner. For covering the boiler and smokehood, this paper is very good. What covering or remnants of such is on the boiler is wetted well, and flour used as cement.

For That 1907 White Steamer.

From W. M. Stewart, Oregon.—We are glad to suggest to Dr. B. S. Hall of Connecticut for his 1907 White steamer that packing for high pressure steam was a problem for us. Warm up the car, clean out all stuffing boxes including the throttle, and apply No. 10 Jewett rings made by the H. W. Johns-Manville Company. Don't set the valve stuffing chambers too tight nor the piston entrance to the crank case but see that the piston, throttle and pump packing is tightened frequently until thoroughly set. Don't stand for any steam leak. It will soon wear a groove that no amount of tightening will overcome. Over-tight stuffing chambers cost good power and unnecessary wear.

If the condenser or cylinder head gaskets leak use 1-16 Permanite sheet packing. While packing the cylinder heads try out the pistons for leaks. With joints all tight and fire and water just right you are safe for 70 miles on a tank of water. The lower your water the more liable you are to carry used oil into the water line. Therefore refill on 40 to 50 miles. We get best results with automatics set for new steam at 600 lbs. This makes the average pressure about 700 but you must be careful not to overheat and injure the tubes.

Your cylinder oil line is clogged. Open up and test the line entire. Disconnect at the oil and steam line and try out with a hand pump, if clear. Examine the automatic oil pump. There can be no resetting of valves and pistons needed. Simply be sure that none of the valve assembly parts are worn. The small valve in the cylinder case may need regrinding with flour emery. Its troubles are usually made known by a "rough" engine which he later complains of. A rough engine on starting comes from insufficient warming up, leaving water in the cylinder heads. Open the pet-cocks a second. A rough engine on a hill is caused by a leak in the cylinder valve, also by dead or slow steam which last would be impossible if your heat shows an average of 390 degrees. We use from 360 to 370 degrees with best all round results.

Probably your pyrometer needs checking with a good thermometer. Your story sounds like about 325 degrees. A good common sense test is to keep the steam heat just below where it will cause a good grade of cylinder oil—"for high pressure dry steam"—to crackle and snap on stopping after a hard pull.

For that "pound" examine all the bearings for wear. I think you get "a hot fire" too late. Clean your vaporizer and feed nozzle and adjust the air shutter to get a fire lower down.

In reassembling the engine see that you have plenty of asbestos around the cylinder case. Soak asbestos into a heavy mush, warm up the engine, then pack all solid. See that all the steam lines are well covered with an asbestos jacket. We covered our hot water lines, and water tank with $\frac{1}{2}$ inch of asbestos and so improved the steam quality. Use extra care to keep the asbestos or emery out of the working parts. Regrind your pet-cocks, a lot of power and water is lost there.

Keep Dirt Out of the Boiler Coil.

From A. N. Henshaw, New York.—Stoppage in the Stanley gasoline line is sometimes caused by dirt in the vaporizing coil above the boiler, though the book of directions does not mention this in discussing burner-troubles. After owning a Stanley for six seasons, the writer has just encountered this particular trouble for the first time. In this instance it seemed

better to pay \$2.75 for a new coil than to try to clean the old one, which was badly clogged. The main-fire, which hardly burned at all, is now as good as one could wish.

Kerosene in a Stanley.

From J. J. S., Kentucky.—Referring to a Stanley steamer, will you or your readers give me some information in regard to mixing kerosene and gasoline and burning it in a regular Stanley burner? Can it be done? And what are the proportions?

Tire Cuts and Bruises.

Under-inflation, overloading and improper alignment are evils that are common, but close attention will easily detect them. Road conditions also play an important part in the life of tires. Stone bruises and cuts are ruinous to automobile tires. Take the damage early and use a little plastic or quick repair gum, and fix the cut or the bruise, and perhaps the unexpected blowout will be avoided.

Cartercar Hill Climbing.

In a recent attempt at hill climbing a Cartercar ascended an incline of 58 per cent. at Forrest Grove, Ore. In the past the Cartercar has very frequently driven up a 50 per cent. incline, which is about 5 per cent. steeper than the average car can climb.

Something New for Vaporizing Gasoline.—This device for vaporizing gasoline is said to be a great gasoline saver. Have you ever considered what makes your automobile engine go by jerks when giving it more gasoline by throttle? This is caused by the raw gasoline getting on the plugs which short circuits your plugs for the time; also raw gas is not so snappy. This raw gasoline is not good for the bore of cylinder as it cuts the oil loose, and in combination with carbon on piston or cylinder it becomes a black muck and it being cut loose with gasoline will get in the crank case. These difficulties can be prevented by the Crone Vaporizer. Try the experiment; put a small amount of gasoline in a teaspoon, then put the same amount on a piece of metal of about one foot square and you will see which will evaporate the quickest. This will give you an idea how the Crone Vaporizer works. This Vaporizer saves gasoline, oil, life of engine, prevents carbonizing, prevents catching fire through vaporizer, eliminates overheating, makes a dry gas, cannot get out of order. This vaporizer is made to slip in manifold, but to get better results they are made up in cages which give more vaporizing surface. For full information, address F. G. Crone, 334 Genesee street, Buffalo, N. Y.

The Hess-Bright Manufacturing Company has transferred its office to its new factory at Front street and Erie avenue, Philadelphia, Pa. The removal of the manufacturing department of the business will be completed sometime during the month of July. The old quarters of this company have been inadequate for its rapidly growing business for a long time. The new site covers some 13 acres and affords ample room for expansion.

Reduction in Tires.—In their June circular the Firestone Tire and Rubber Company of Akron, Ohio, announced a reduction in Firestone tires. This com-

pany prides itself on the quality of its tires. It says in the circular before us, "We would rather raise the price of Firestone tires than lower the quality." That seems to us to be the correct attitude to take. The average car owner is more concerned about the quality of the tires he uses than he is to get his tires at a discount. The Firestone tires of course are for sale by dealers everywhere. Special attention is directed to the Firestone Quick Detachable and Demountable Rim. If you do not know about these, send for booklet giving full particulars, showing just how the rims are constructed and how the tire is held in place.

Remarkable Ball Bearings.—An inter-urban electric car on the Atlantic City & Shore Railroad has been in continuous service for the last $3\frac{1}{2}$ years on one equipment of Hess-Bright ball bearing journal boxes. In this time it has run about 150,000 miles. Recently one of the journal boxes with its two bearings was removed from one end of the axles for examination. They were found in the same condition as when new, with no visible evidence of wear. In order to determine precisely what wear had taken place both of these bearings were sent to George M. Bond of Hartford, Conn., one of the leading experts in the world on accurate measurements. In interpreting these measurements it should be borne in mind that the end thrust of the axle is taken on one bearing in each box, which in this case is bearing No. 2. In a letter accompanying his report Mr. Bond remarks: "I am confident that the result as found in the test of these two railroad type bearings must show conclusively the remarkable wearing quality of the Hess-Bright ball bearings as well as the precision of workmanship in their production." The wear was practically nothing.

During the $3\frac{1}{2}$ years that these bearings have been in service they have re-

quired no attention save to repack with grease about once in ten of twelve months. The performance of these bearings seems to show that hardly any limit can be assigned to the durability of the right kind of ball bearings in main journal service. Aside from the mere cost of the power they save, it must be borne in mind that friction cannot take place without wear, and that the friction of plain bearings is an index to the wear of the boxes and journals and the certain necessity for repairs.

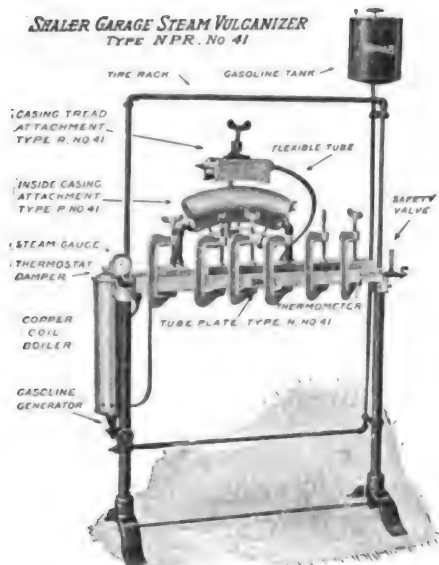
Correction.—We regret that through a blunder the cut in the advertisement of the Motor and Mfg. Works of Dunkirk, N. Y., in the July issue, showing the clamp cutout valves was placed upside down. While, of course, an expert would understand the matter, as it would probably have no more effect on him than the placing of a letter in a line up side down, which would be easily recognized, we take pleasure in calling attention to the matter.

The Low-Priced Horn with the High-Priced Voice.—Not many of our readers will miss seeing the attractive full page announcement in this issue of the Troy Auto Specialty Company, Troy, N. Y. The Exo horn is said to be indestructible and will outlast any ordinary car. It makes a clear, strong signal from the air exhaust of the engine. Note the advertisement and order either from your dealer or direct, as may be most convenient.

The Otto Gas Engine Works of Philadelphia, the original manufacturers of the OTTO car have no corporate connection with the Ottomobile Company of Mt. Holly, N. J. The New Jersey concern has been acting only as sales agents for the past year. We understand that hereafter the Otto Gas Engine Works will handle their output direct with dealers throughout the United States and abroad.

A New Garage Vulcanizer.

The Shaler line of portable steam and electric vulcanizers for motorists and garages has been strengthened by the addition of a new model designed to cover the entire requirements of garage or repair shop. This new machine combines apparatus for mending any tire injury from a tube puncture to a large casing blow-out. The tube plate has a



machined surface 4x30 inches and will vulcanize six tubes as quickly as one. It can be heated independently of the casing attachments or used simultaneously with them. Pressure is applied to tubes by swivelled clamps that insure uniform pressure to every part of each repair.

The Shaler method of making wrapped tread blow-out repairs, curing from inside and outside of a tire at the same time is simple and most economical, as is evidenced by the fact that it has been adopted by tire manufacturers and others. Instead of cutting away a lot of expensive rubber and fabric, a reinforcement of heavy fabric is built up inside of the casing and the hole through the rubber is filled with Para gum. Type P goes inside of the tire bringing its heat directly against the fabric; Type R heats the repair from the outside. A wrapping of tape and the Shaler clamping device produce an enormous pressure that forces the new and old material into most intimate contact. Type R will also mend sand pockets and tread cuts while tire is on wheel, fully inflated. The boiler, a copper coil heated by a powerful gasoline burner, raises steam to the vulcanizing pressure in about twenty minutes. Probably the most valuable feature, and one which is exclusive with this machine, is a thermostatically controlled damper that keeps the pressure and temperature of the steam at the correct vulcanizing point automatically. This not only does away with the constant vigilance necessary with vulcanizers not possessing it but eliminates danger of imperfect repairs and makes the machine so safe that even a boy could operate it. This vulcanizer is manufactured by C. A. Shaler Company, Waupun, Wis.

The Burke Valve.—This valve is said to cut off two-thirds the time and labor of tire pumping. There can be no question that car owners frequently neglect

their tires, that is, fail to keep them inflated to the proper point because of the tiresome nature of pumping with an ordinary pump. With the Burke valve it is said that the inflation is quick and easy, but read the advertisement and consult the cut in the advertisement, showing how the valve works. Better write to The Burke Valve Company, 233 The Arcade, Cleveland, O., for Booklet A, and it will be promptly sent to you. Dealers and repair men are invited to examine cut of this valve carefully and are requested to note the big selling points referred to in the advertisement.

New R-C-H Agents.—The R-C-H Corporation of Detroit, Mich., manufacturers of two different styles of automobiles, Standard Model selling for \$850 and Model E E selling for \$900 have signed contracts for the year 1913 with the following parties for the sale of their cars.

The Smith Motor Car Co., Hazleton, Pa.

Shaffer Mfg. Co., Baltimore, Md.
W. L. Reisinger, Newport, Pa.
Model Garage, Lynchburg, Va.
Yale Motor Co., Camden, N. J.
Peters & Kittell, Hornell, N. Y.
Willard Morris, Dansville, N. Y.
F. E. Wickwire, Elmira, N. Y.
Slawson & Lounsberry, Jamestown, N. Y.

Cook Bros., Castle, N. Y.
The Muncie Motor Co., Pasadena, Cal.
William H. Hedges, Southampton, N. Y.

I. A. Silvie, Jr., Pt. Richmond, N. Y.
The Central Motor Car Co., New York, N. Y.

James N. Bussey, Troy, N. Y.
Walter J. Connelly, Hartford, Conn.
O. W. Smith, New Philadelphia, Ohio.
Vincent & Hurd, Hiram, Ohio.
Olds-Oakland Motor Co., Cincinnati, Ohio.

Drayton Auto Co., Drayton, N. D.
White Bear Auto Co., St. Paul, Minn.
Olson-Hemming Auto Co., Morris, Minn.

Dailey Motor Co., Washington, N. C.
W. T. Hearne, Whitakers, N. C.
Capitol Motor Car Co., Raleigh, N. C.
W. A. Blackburn & Co., Goldsboro, N. C.

Worley & Terrey, Viola, Ill.
E. L. Warneke, Sterling, Ill.
J. H. Reichardt & Co., Cornell, Ill.
C. C. Hinckley, Aurora, Ill.
Victor F. Michelson, Chicago, Ill.
H. Ohlendorf, Freeport, Ill.
Sears Automobile Co., Des Moines, Ia.

John M. Knapp, Rensselaer, Ind.
Niles Center Garage Co., Niles Center, Ill.

A. A. Marvin Son & Co., Maple Park, Ill.

Heckbarth & Schering, Palatine, Ill.
G. A. Weber, Jackson, Michigan.
Worthrup & Clark, Houston, Tex.
Coles Bros. Malta Bend, Mo.
A. Wells & Co., Breymer, Mo.
Bert E. Layson, Bethany, Mo.
Lawton Motors Co., San Antonio, Tex.

J. A. Ewing and A. R. Atkins, Kent, Ohio.

T. J. Collins, Northampton, Mass.
Weber Imp. & Auto Co., St. Louis, Mo.

Chas. E. Hammerly, Chicago, Ill.
John Bauer, Jr., Strasburg, Ill.
Niagara Falls Auto Transit Co., Niagara Falls, N. Y.

W. A. Struve, Bloomer, Wis.

W. Middleton Sheppard, Bridgeton, N. J.

Geo. W. Turner, Shamokin, Pa.
Ulster Garage, Kingston, N. Y.
F. M. Cole, Osborne, Kan.

Punctures Conquered.—The simplest things in the world are sometimes the most wonderful, as are many of the most wonderful, the simplest. The problem which for so many years has puzzled the experts to solve—that of making pneumatic tires puncture-proof without deadening their resiliency—has at last reached a solution. And like other great inventions it is very simple. It is a liquid called Sealo. With Sealo injected in your tires—it is easy to do—you can run over a nail and not know it. Pulls the nails out if you will—and still there is no loss of air. Thus does it not only save you annoyance of mending punctures, changing tires or wheels, but prevents you running your tires by running flat on the rims. Nearly all good dealers now have Sealo and whether you doubt its wonderful action or not, a guarantee of money back as well as replacement of rims or tubes is given with every one. Incidentally it really preserves the tubes as the Sealo Tire Company, 1409 Michigan avenue, Chicago, can demonstrate.

The Monarch Timer.

The Monarch Timer illustrated herewith is made by the Benford Mfg. Co., 150 Pearl street, Mt. Vernon, N. Y. This timer is especially adapted for Buick, Maxwell and Ford cars. It is a device which is the product of a practical experienced mechanic and is placed upon the market only after a long and severe test in actual service. The detail and working parts are absolutely



The Monarch Timer. Manufactured by Benford Mfg. Co., 150 Pearl St., Mt. Vernon, N. Y.

correct and reliable and the material used in the construction is the best to be found. This timer is guaranteed for one year. It will be sent to readers of this magazine at the following prices: one cylinder, \$2.75; two cylinder, \$3.00; three cylinder, \$3.50; four cylinder, \$4.00; six cylinder, \$5.00. The same company manufactures a line of spark plugs celebrated for their high quality. See special offer in our advertising pages this month. Mention this magazine in your correspondence with this house.

GARAGEMEN

MAKE BIG PROFITS WITH A

“NATIONAL” Garage Vulcanizer

WHY? Because the “NATIONAL” was designed by a man long connected with the largest tire factory on earth, and knew just what was needed to do the work *right* at the lowest possible cost. Vulcanizes Three Tubes and Two Casings at a time. Heated by either gas or gasoline.

The old complicated vulcanizers are things of the past. Our machine is so simple to operate that, with complete instructions furnished, any boy can do perfect work. Hundreds of our customers have written that they paid for the machine with the profits made the first few days. This machine is nothing new and untried, as it has been on the market nearly two years, and is made by one of the oldest and largest vulcanizer manufacturers on earth. Don't take a chance on a new article where the bad features have not been eliminated. We had them at first the same as everyone else.

SPECIAL OFFER!

We are running a very special offer at present which brings the actual cost of the machine way down within the reach of the smallest garage. We want one in every town in the U. S., and will put you in position to get one, even though your capital is small. Your credit is good with us.

Regular Dealer's Price, complete with Full Instructions and Supplies to get started, **\$45.00**
but we want you to write for our *Big Bargain Offer at once.*

“NATIONAL” Portable Steam Vulcanizers For Individual Car Owners

Nearly 30,000 now in use. **Steam won't burn your tire.** For both tubes and casings of any size. **Send for one on ten days' trial.** If you find it worth much more than the price, keep it and send us \$12, or return the machine to us. You don't see any other manufacturer making this offer! They are afraid to, yet we have been making it for four years. Full instructions and all supplies with each outfit. **SEND FOR ONE NOW.**

THE NATIONAL MOTOR SUPPLY CO., FACTORY 1901 EUCLID AVE., CLEVELAND, O.

Please mention the Automobile Dealer and Repairer when writing to advertisers.

Haco Motor Stand.—This device is for use in repair shops and factories for disassembling, assembling, testing and painting motors. It is adjustable to any motor and self-locking in any position. The motor may be easily turned to any desired angle by one man. It provides easy access to connecting rods, cam shaft, etc. The fly wheel of the motor may be belted to any convenient pulley for working in bearings, etc. For further particulars and prices address the Hathorn Auto Company, Dept. B., Mason City, Iowa.

Fore-Doors Automobile Specialty Manufacturing Company, 326 East Market street, Indianapolis, Ind., makes a specialty of fore-doors. They make them to fit all standard makes of automobiles. Write for prices and description.

Free Route Books.—Large numbers of our readers will, no doubt, be interested in the announcement on another page of the B. F. Goodrich Company of Akron, Ohio. They state that the Goodrich Route Books will be sent absolutely free to any reader of this paper desiring one or more, who in writing will mention their advertisement in The Automobile Dealer and Repairer.

Another Factory Addition.—The Clark-Carter Automobile Company, of Jackson, Mich., manufacturers of Cutting motor cars has nearly completed its large and extensive four-story addition to the present plant. They expect to occupy it by August 15th. The completion of this new building will relieve the present congested condition of the factory and will so greatly facilitate manufacturing for the season of 1913 as to permit production to be doubled. They were unable to supply one-third of the orders placed for their 1912 models and consequently, were forced to make these large additions.

The Baldwin Smith Motor Truck Company, located at 115 East Second street, Wichita, Kansas, has been organized for the purpose of handling commercial motor trucks in Wichita and vicinity. They have closed a contract with the Lincoln Motor Car works of Chicago, Ill., whereby they become distributing agents for the Lincoln light delivery wagons.

One Rub Turns Brass to Silver.—No reader will be likely to skip the prominent advertisement of the Atlas Auto Supply Company, 77 East Adams street, Chicago, Ill., on our front cover. "Silver Quick" is a preparation as the advertisers say for turning brass into silver. But consult the announcement of this company and you will know all about it. Dealers are wanted by this company everywhere to handle their products which include "Tire-Doh" and many other articles.

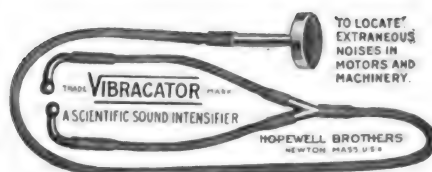
Destroy-O Carbon Remover.—This is a liquid carbon remover manufactured by the Atlas Auto Supply Company, 77 E. Adams street, Chicago, Ill. This company wants to get in touch with dealers everywhere to act as agents for the sale of this preparation and others which they manufacture. They say that Destroy-O Carbon Remover is put up in 50 per cent. bigger packages but at no bigger price.

Daisy Lighting System.—The Simkin Manufacturing Company, 1507 Michigan avenue, Chicago, Ill., have an announcement in this issue illustrating and describing their Daisy Lighting System

for electrically lighting gas head lights in connection with any standard gas tank. There are no batteries, coils or complications and absolutely nothing to wear out so the manufacturers state. This system can be installed in connection with any jump spark ignition system in an hour or two. The system is controlled from the seat. This company deals direct with retail dealers and garage men and gives them the benefit of discounts usually given to the jobber. They would like to hear from every dealer or garage owner who is a reader of this paper as promptly as may be convenient and have a special proposition to submit.

The "Vibracator" for Locating Knocks.

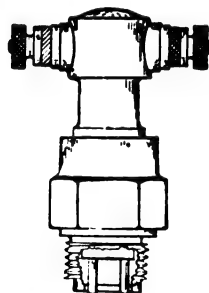
This appliance, as illustrated, is a scientifically designed sound intensifier and was designed by a graduate electrical engineer on scientific principles. It should not be confused with cheap devices for the same purpose. The "Vibracator" will enable the car owner or repair man to locate a "knock" quickly and accurately. It is excellent for detecting such troubles as loose piston



rings, connector rods in motors or loose gears in transmission gears. This instrument is manufactured by Hopewell Bros. of Newton, Mass. and most of our readers may already know that the name of this firm is in itself a sufficient guarantee of quality. The price of the Vibracator is nominal, and every car owner can afford to have one; in fact he cannot afford to be without one, as the little device is likely to pay for itself several times over in a short time. Write direct to Hopewell Bros. for price and particulars and mention this magazine.

A Double Spark Plug.

The claims made for the Superior Double Spark Plug are that it avoids ignition trouble, saves gasoline, and in-



The Superior Double Spark Plug.

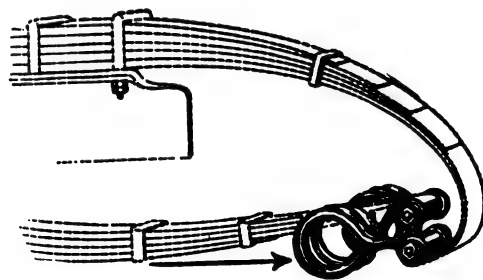
creases the power of the car 17½ per cent. This is said to have been proven by tests made under the auspices of the Automobile Engineer Society. It is easy to understand that, however rapid combustion may be, it must take some fraction of time for flame to spread through the volume of gas, and if instead of one flame, it is possible to start two or more flames simultaneously from points which will reduce the distance each has to travel, before combustion in every nook and corner is complete, it is

only reasonable to expect an increase of power. The matter is certainly of interest to the car owner, and the cost will be little to test it. Write to the manufacturers, the Superior Motor Specialty Company, 44 North 4th street, Philadelphia, and get circular and prices.

Watch Dog Lock.—Physicians and others who have occasion to leave their cars on the streets or highways while attending to business should consult the announcement in this issue of S. Breakstone, 1712 Michigan avenue, Chicago, Ill. This little device which he calls the "Watch Dog Lock," costing but a trifle, may save every reader of this paper from losing his car. See testimonial from Dr. John R. Wathen in the advertisement referred to, and in ordering or writing for further information mention The Automobile Dealer and Repairer.

The Acme Torsion Springs.

The manufacturers of this device, which is illustrated herewith, state that Acme Torsion Springs stop vibration, prevent spring crystallization and breakage, minimize tire and engine trouble and improve the riding qualities of any car at least 75 per cent. They are said to fully answer the same purpose as shock absorbers and even to accomplish the same object more effectively and they cost much less than a shock absorber. They add, it is claimed at least 18 feet to the total leaf spring area, every inch adding greater resiliency, automatically controlled. The device is adaptable to all leaf springs. It does not require special mechanical skill to put the Acme on your car. Anyone can apply it quickly and easily. Delighted users everywhere are testifying to the great value of this invention. In Boston, 113 cars of the Taxi Service Company have been equipped with these springs and many other large corporations in New England have adopted them as regular equipment. Acme Torsion Springs are sold under a strong guarantee. If they do not do all that is claimed for them, the cost will be cheerfully refunded any time within thirty days after date of purchase. They are sold only for cash, but the purchaser is



A New Spring.

amply protected by this guarantee. Good dealers can make money selling these springs and direct purchases from car owners are also solicited. Write for full information and prices to the Acme Torsion Spring Company, 23 Cambria street, Boston, Mass., and in writing them, mention this magazine.

Subscribe to the "Automobile Dealer and Repairer," \$1.00 Per Year.



The **DAISY LIGHTING SYSTEM**

**FOR ELECTRICALLY LIGHTING
GAS HEADLIGHTS in CONNECTION
WITH ANY STANDARD GAS TANK**

No batteries, coils or complication, and absolutely nothing to wear out.

Can be installed in connection with any jump spark ignition system and any standard gas tank in one to two hours.

Lights, extinguishes and controls the gas headlights from the seat.

We deal direct with retail dealers and garagemen, and give them the benefit of discounts generally given the jobber, making the DAISY LIGHTER the most profitable accessory on the market as well as the most reliable and convenient electric gas lighter ever made.

Every gas lighted car should or will be equipped with an electric lighter, and live dealers and repairers will get the business.

The DAISY will help you get your share.

Write today for Circular DL.

SIMKIN MANUFACTURING COMPANY

1507 Michigan Avenue, Chicago, Ill.

Direct Advertising

The Automobile Advertising Company will address, fold and mail your printed matter or letter to every automobile owner in the United States, or in any particular section, at a moderate cost, and save you the trouble and expense of keeping up lists.

If you want to address owners of new cars as soon as they register, we can do that for you, or if you want to reach the owners of certain makes of cars, we can do that for you.

If you want lists of owners in any State or for any make of car, we can furnish them.

We also get all returns that our customers receive from the Post Office, and those names are taken from our files immediately. **YOU DON'T BUY DEAD NAMES.**

We have the names of 493,000 actual automobile owners in our files. They are your public, and only through our service can you reach them.

If you will write us we will give you the benefit of an experience that is saving thousands of dollars for some of the biggest advertisers in the country.

Automobile Advertising Company

385 Fourth Avenue

New York City

We learn that the new steamer "City of Detroit III," built for the Detroit and Cleveland Navigation Company and said to be the largest and finest side-wheel passenger steamer in the world, had all the joints in the piping connected with it packed with the J-M Permanite Sheet Packing which is manufactured by the H. W. Johns-Manville Company, 41st street and Madison avenue, New York.

The Michigan Buggy Company of Kalamazoo, Mich., has broken ground for an addition to its factory which will add 50,000 square feet of floor space. This extension has been made necessary by the heavy demands, we understand, for the 1913 model car manufactured by this company.

In our effort to keep our readers posted about new things gotten out by

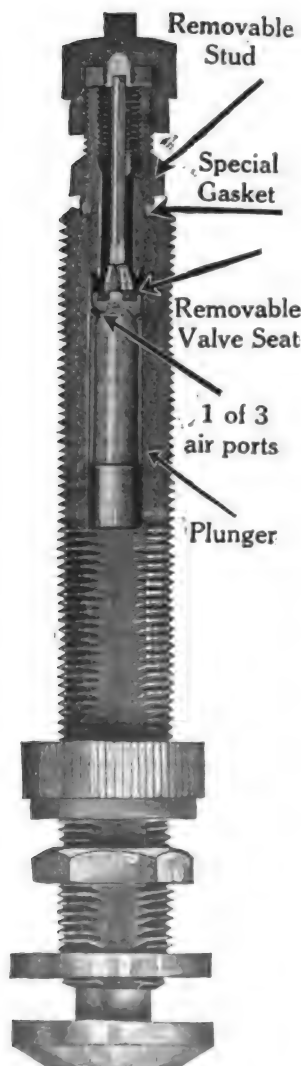
dependable firms, we publish herewith illustration of 50c. box of Rex Velvet Nickel Polish made by Armiger Chemical Company of Chicago, Ill., manufacturers of the well known Rex Metal Cream Polish. This new polish was developed from the increasing demand for a polish that would not wear away plating more than an infinitesimal fraction of the wear from any polish intended for general use; and, for something that would at the same time protect the plating from corrosion. This demand has been unmet until now, and how well the manufacturers have succeeded in filling this long existing vacancy in the polish line, may be easily discovered as the retail price is nominal. Dealers would do well to ask for quotations.

Free Trial Offer.—The American Tire and Rubber Company of Akron, Ohio,

have a full page announcement in this issue of their Free Trial Offer No. 2 on "American" cements and repair stocks. They would like to have every reader interested inspect their advertisement and write at once for further particulars concerning this offer.

The Improved Priming Cup.—By using this cup the manufacturers, E. Edelmann & Company, 229 West Illinois street, Chicago, Ill., say there will be no more leaking, sticking, breaking or hurting your fingers. One-quarter turn of the handle opens the cup for priming. Can be attached in places where no old style can be used. Every motorist will, of course, want one as soon as he sees it. Dealers should put them in stock at once. Write for descriptive circular and price list. This cup sells at such a low rate that every motorist can afford to have one.

How the BURKE Valve Cuts Off Two-thirds the Time and Labor of Tire-pumping



Your tires **must** be kept properly inflated. No matter how good the tire, every manufacturer insists upon proper inflation as the prime requisite to the life or mileage of his product.

BURKE Valves make proper inflation quick and easy. Quicker; because of three times greater capacity to transmit air into the inner tube. Easier; because there is no spring resistance to overcome in charging the tube.

Other valves are spring closed, creating an average of 20 lbs. to the square inch resistance to the charging pressure. This means that when you use a pump having a piston area of 2 square inches, you must exert 40 lbs. extra pressure at each stroke before you can even begin to get air into the tube. As it takes over 100 strokes to inflate the average tire, that's 4000 lbs. extra labor. Think what that means.

The BURKE Valve eliminates all this two tons of extra labor, for it has no spring resistance whatever. Being a "balanced" valve, the pressure inside the tube always equals that in the pump chamber. The air pressure within the tube closes the valve automatically, making it air-tight at only a few pounds pressure. Hence no springs are required.

These features cut off two-thirds the time and labor of tire-pumping.

TO DEFLATE, just hold the plunger down. There is ample capacity to deflate any inner tube in less time than required to remove the parts of other valves—and no risk of losing the parts.

STANDARD AND UNIVERSAL

BURKE Valves are standard as to size, and their parts are universally interchangeable on all our types for automobiles, motorcycles and bicycles.

Furthermore, as the stud or end section of any valve is the part most likely to become battered or damaged, we make BURKE Valves so these parts can be removed and new ones substituted without touching the inner tube. This feature saves the valve and the time and expense of a new one.

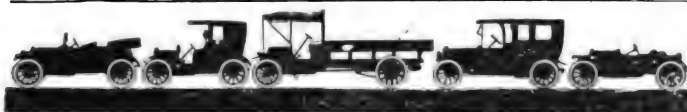
After rigid tests, many automobile manufacturers have already adopted BURKE Valves as part of their 1912 and 1913 tire equipment.

AUTO OWNERS: Demand BURKE Valves on your inner tubes. If your Dealer does not carry them, write us for "BOOKLET A," and we will see that you are supplied.

TIRE DEALERS AND REPAIRMEN: You can readily see the tremendous selling points of BURKE Valves. Write at once for our "BOOKLET A" and price list.

THE BURKE VALVE CO.,

233 The Arcade, CLEVELAND, O.



Mobiloil

No one lubricating oil is best for all cars. Gargoyle Mobiloil gives you a grade for each type of motor. Use the grade shown in our complete recommendations. Mailed on request.

VACUUM OIL COMPANY, Rochester, U. S. A.

General Sales Offices, 29 Broadway, New York City.

HOLD YOUR BREATH

UNTIL YOU GET OUR 1913 AGENCY PROPOSITION

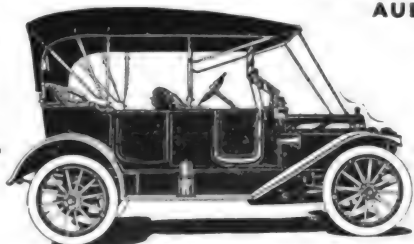
WRITE US THIS MINUTE

IT IS ALL VELVET FOR YOU

W. H. McINTYRE CO.

Catalog
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AUBURN
IND.



GRAY CUT-OUT

Cut Notch in Pipe and Clamp over it.

There's Nothing Better.

Price, \$1.50 to \$2.50.

GRAY LOCK PEDAL

Simple and Efficient.

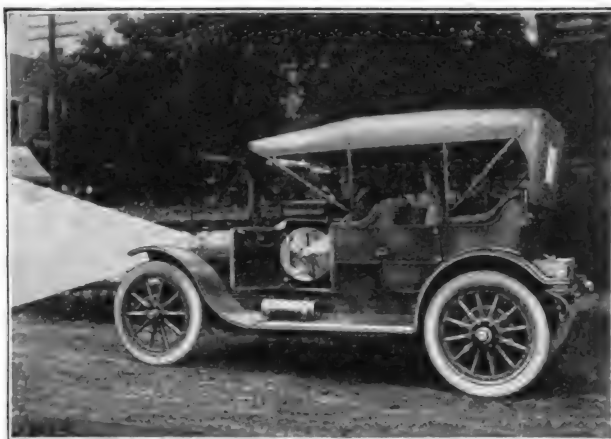
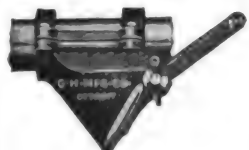
Price, \$1.00. Without Lock, 85c.

ASK FOR CATALOG No. 41

It describes our complete line of Gray Mufflers, Autochimes, Autalarms, Filters, Pedals, Valves, Motor Boat Fittings, etc.

GRAY-HAWLEY MFG. CO.

937 JEFFERSON AVE. DETROIT, MICH.



Borrow a spark from your motor to light your gas lamps

By simply turning a disc, without stopping your car, you can light your lamps from the seat—no trouble—no coil, no battery—all the convenience of electricity. The Acme Auto-Liter is not an experiment—we absolutely guarantee to refund your money if it does not do the work.

Something entirely new—one half-turn of the disc creates a spark at the burner and turns on gas automatically. Simple, convenient, reliable. Can be quickly and easily attached to your automobile—no complicated parts to get out of order—all the convenience of electricity.

Acme Auto-Liter

No more stopping your car, getting out in the mud and rain, scratching matches to light your lamps—that's the old way—there is a quicker, easier and more convenient way. When darkness overtakes you, without leaving your seat, you simply turn a disc and your headlights flash on, all regulated. When you wish to leave your car, by a slight turn of the disc, you can extinguish your lights, or turn them down as low as you wish—a worth-while saving in gas.

The Acme Auto-Liter comes all complete with full instructions for attaching. The price is low—within your easy reach—this automatic lighter will more than save its cost in gas within a few months.

Here at last is the automatic lighter you have been watching and waiting for. One trial and you will wonder how you ever got along without it. At least investigate. In requesting full information you promise nothing—obligate yourself in no way—so write today.

Acme Auto-Liter Company

Department C, Bloomfield, Ind.

DEALERS—Quick and easy seller, write quick.

Classified Advertisements

Under this head will be printed advertisements of Second Hand Cars Wanted or for Sale, Accessories of any kind Wanted or for Sale, Shops for Sale or Rent, Situations or Help Wanted, Second Hand Tools or Machines For Sale or to Exchange, at the uniform price of three cents a word, including the name and address, for each insertion, payable in advance. No advertisement will be inserted for less than 50 cents, however small. Remittances may be made in postage stamps or in any convenient way.

Classified Advertisements

Address MOTOR VEHICLE PUBLISHING CO., 71-73 Murray Street, New York.

AUTOMOBILE INSTRUCTION—The West Side Y. M. C. A. Automobile School gives a practical course in shop and road practice in four or eight weeks, day or evening. Provision made for out of town men. 322 West 57th St., N. Y. City.

PATENTS SECURED—C. L. Parker, Patent attorney, 962 G Street, Washington, D. C. Inventor's handbook upon request.

STEAM CAR CORRESPONDENCE SCHOOL. Finely written and illustrated course. Only school in world. Circular sent. 520 Fourteenth St., Denver, Col.

FOR SALE—"Steam Car Owners." Myers Kerosene Burner—Something new. Send for circular. 729 West Colfax, Denver, Colorado.

BROKEN CRANKSHAFTS, cylinders, crankcases, flywheels, gear teeth, pistons, perfectly welded and machined ready to replace. Guaranteed and references. Machinery up to 5 tons welded. Atlas Welding Works, 74-76-78 Irving St., Rahway, N. J.

TOPS—Until further notice, runabout top \$22, touring car tops \$35. C. G. Meyer & Son, Tiffin, Ohio.

CYLINDERS REGROUND, and fitted with new pistons and rings for \$15.00 per cylinder. We make parts and cut gears of all kinds. Send us your old parts and we will repair or duplicate them in record time. Cracked cylinders, gear cases, etc., welded and made good as new. Aluminum, bronze and brass castings of every description. Phosphor bronze bushings in the rough carried in stock. Address, The Adapt Machinery Company, 1624 Wabash avenue, Chicago, Ill.

DON'T FORGET.
FORD AGENTS—WE MAKE A SPECIALTY of Dust Hoods to cover Top when Clashed down for Model T Ford 1910-1911-1912 Cars. Write for prices, also Cellulose, best Substitute for Glass used in Automobile and Buggy Storm Fronts, Side Curtains, etc., Sheets 20 x 36 in., 86c., 12 x 20 in. 36c., 18 x 20 in. 45c., 20 x 24 in. 68c., postpaid. Haews Storm Front Co., Coldwater, Mich.

AUTOMOBILE boilers bought, sold and repaired. Lucas & Son, Bridgeport, Conn.

MODEL T FORD OWNERS—You need my valve adjusters. They make a good car better. More power, better mileage, less noise. A good proposition to owner agents. Ira Lavender, Webster City, Iowa.

N. E. AUTO LIST—Weekly registrations of all N. E. States as reported, \$10 yearly; year book \$3. Auto List Co., 138 Pearl St., Boston.

500 NEW pressed steel auto frames 163 in. long, 38 in. wide. Send for sketch. \$10.00 each. Lucas & Son, Bridgeport, Conn.

Don't Metal Polish Your

life away, but finish the brass parts of your auto with **Stay Shiny**—The Marvelous Tarnish Preventive, and have them look gold plate all the time. Saves hard, dirty work, time and money. One invisible coating preserves original high polish and absolutely prevents tarnish on lamps, radiators and trimmings for months under heat, rain, and all weather conditions. Easily applied, easily removed when desired and non-injurious to metal. Fully guaranteed. Price \$2.00 pint can, with brush. Express prepaid. A year's supply. Thousands of auto owners are delighted users of this long looked for preparation. Agents wanted. Easy seller. Big profits. If not sold by dealer, will send can prepaid upon receipt of price. Write me right now.

F. H. SCHMOEGER
Sterling, Ill.

THE LATEST FAD—Ebonize your brass. Sterling Black Brass Enamel imparts a beautiful, lustrous ebony black finish to brass auto lamps, radiators, wind shields, horns, and all trimmings, retaining its original high lustre for years, with one application and without further attention. Resists intense heat, rain and all weather conditions. Never blisters or scales off. Dries in a few minutes. Easily applied, easily removed if desired and non-injurious to brasses. Fully Guaranteed. Send \$1.00 bill for can. Charges prepaid. Saves all that dirty, never ending polishing work. Not asphaltum paint or oil varnish, but the only black lacquer of proven merit on the market. Agents wanted. Enormous demand. Good profits. Sterling Polish Company, Sterling, Ill.

BROKEN CYLINDERS AND CRANKCASES welded expertly and guaranteed. See our adv., page 27, for details. Waterbury Welding Company, Waterbury, Conn.

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Radiators made or repaired for any type car.

Have a new radiator made for your car and increase its value 25 per cent.

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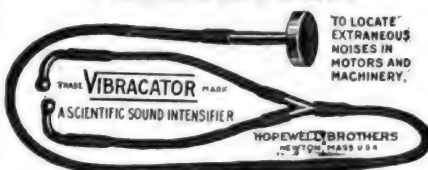
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Detroit, Mich.

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full particulars of the Bridges Starter for Ford owners and dealers. This company wants every dealer who is a reader of this paper to write at once for special sales proposition on this starter, and they also desire every reader who owns a Ford car to communicate with them at once. The Fowler Sight Feed Priming Cup is furnished free with each starter.

The plant of the R-C-H Corporation, of Detroit, Mich., we understand, looks something like a tented city these days. No less than three tents have been erected to afford extra room in the production of the new 1913 cars manufactured by this corporation.

Mosler Spit Fire Plugs ARE THE BEST
A. R. MOSLER & CO.
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Moore Tire Saving Jacks
 Relieve the tires from weight of the car—prevent weak spots that come from tires standing on only garage floors. Small boy can jack up car in half-minute—easy—slip loop over hub and push down the lever \$6.50 per set of four prepaid. Will cut your tire bills in half.

Double the Life of Your Tires

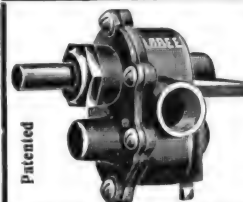
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Absolutely Automatic.

This shield operates with more ease than any other.

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are the easy riding kind that end puncture and blow-out troubles. Guaranteed 10,000 miles, two years. Fit any standard clincher, universal, quick-detachable or demountable rim.

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A Jury of
Eminent Users
Enter the
Following
Verdict!



On the Twin City to Helena Tour.

"BRICTSON" Detachable Tire Treads

Here's
Bricton

Here's
the Jury
You Be the Judge!

Bricton Treads are
worth looking into.
You will find them a
vital source of tire
economy.

In our literature are
put before you some
FACTS that we haven't
the space for here—learn
more about Bricton De-
tachable Treads and start
saving \$3.00 out of every
\$4.00 you are now spending
for tire expense.

are satisfactory—they save \$3 out
of every \$4 spent on tires—they
uphold every claim made
by the makers.

Now We Want You
To Be Your Own
JUDGE

in his 66-H P. 7-passenger Pierce-
Arrow (fully equipped with the
famous Heavy Car Type "BRIC-
TSON DETACHABLE TREADS"),
which was the Official Press Car in
the Twin City-Helena Auto Tour that
took place July 20-28, 1911. FACTS
ARE as follows: There were 22 cars in
this tour on which there were replaced
200 new tubes and 90 new casings, making
an average tire expense of \$256 on each car
as against not one cent for tire expense on
the only car equipped with the BRICTSON
treads. (As Press Car, the Pierce-Arrow,
equipped with BRICTSON treads, carried the
greatest proportionate weight.) Do you want
results? Then buy Bricton treads! Surely this
is a record of results demonstrating a positive
tire saving that one can't pass up without
second thought.



In the Little Glidden Tour, from Minne-
apolis to Fargo and back—a distance, as
traveled, of 565 miles—the Chalmers Road-
ster equipped with BRICTSON treads, was
the only car to go through the entire trip
without tire troubles or expense. 27 cars
were entered for this tour. More "proof."

Better Get Information
on the "Bricton" today.

You insure your life while you are insur-
able. Then why not insure your tires
while they are insurable? Remember
the BRICTSON treads are to protect
tires—not to "rejuvenate" them! So,
while your tires are good keep them
good.

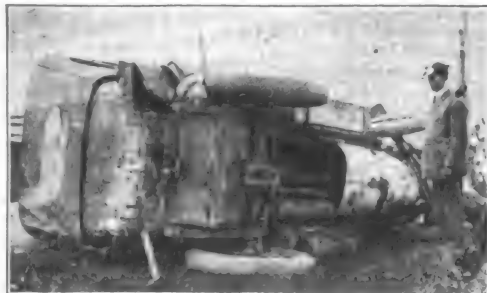
\$4—\$3—\$1

Primary class? No, just
a problem that looks good
to all motorists who adopt
"BRICTSON" treads.

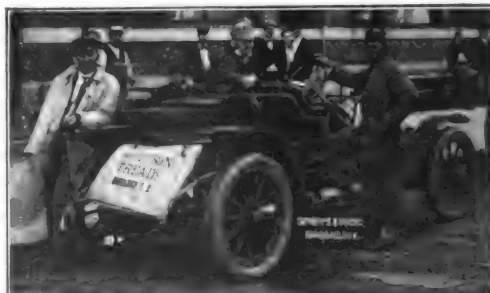
Where an owner usually spends \$4
—with "Bricton's" he now spends
\$1, that's all! A pure and simple sav-
ing of \$3 out of \$4.

Want us to give you a concrete example of
the exact saving mentioned above? Then
sign and send the Motorist's
Coupon to-day. This will
put money in your pocket.

So get the coupon back to us,
quick—we'll put additional
"evidence" in your hands and
let you act as your own judge.
And you, Mr. Dealer, will want
information about the "Bric-
tson." Why? Because the
owner will demand them and
you can't afford to "block"
such a profitable game, can
you? Let us give you details
by return mail.



On the Big Glidden Tour, New York to Jacksonville.



On the Little Glidden Tour, Minneapolis to Fargo.

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Without obligation on my part send me your Exclusive
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City.....State.....
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The
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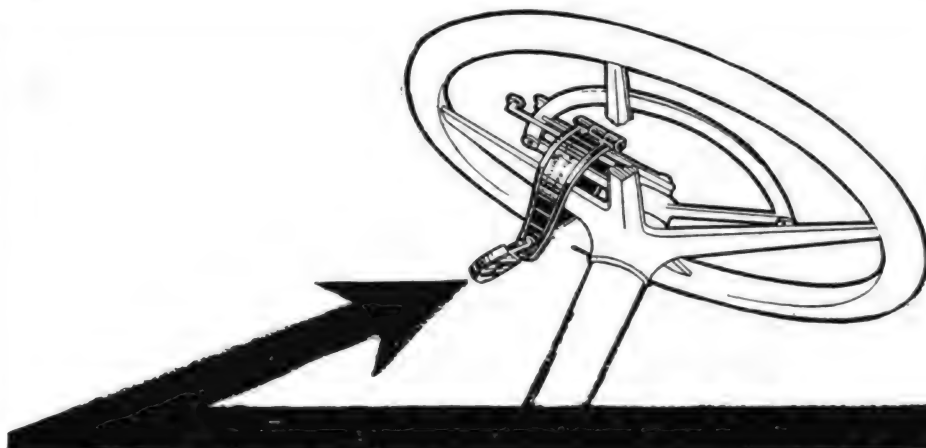
MOTORIST'S COUPON.

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I am interested and would like to know more about "Bricton"
Detachable Treads. Send me your booklet, "The Enemy of
Tire Expense," Proofs from Automobile Owners, Prices, etc.

Size of Tire.....
Name.....
Address.....
Dealer's Name.....

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Get This Sure Protection Against Car Robbers

The automobile has opened a new field for thievery. Unguarded cars are stolen every day. Over 5,000 owners suffered last year. Thousands more will undoubtedly suffer this year. Insurance records show that 90% of the stolen cars are abandoned after a smash-up, or after most of the equipment has been stolen. In either case the loss is heavy. Absolute protection forever costs but \$2.00—one cent a day for 200 days.

The Watch Dog Lock

PATENT APPLIED FOR.

In ten seconds, right from the seat, you can lock the gas, spark and steering wheel, with the motor "dead" or running. Either way your car can never be started or steered until the "Watch Dog" is unlocked.

Safer Than a Garage

No keys on earth, save two we give you, will fit your "Watch Dog." So the "Watch Dog" protection is absolute. It makes your car safe anywhere—for any length of time. You are relieved of worry—insured against loss.

Your Car Deserves It

Many pay \$500.00 to \$5000.00 for a car without giving a thought to its safety when left alone. So the newspapers are full of automobile robberies by joy riders and equipment thieves.

Your car is surely worth more than \$2.00! The value of your car merits this small investment! Your car deserves this sure protection!

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About one month ago I purchased from you a "Watch Dog" Auto Lock. I recently, one evening, left my car (Chalmers) in front of a theater for several hours, and when I returned to the car the "Watch Dog" had been bent all out of shape in an effort to break it loose and steal my car. The thieves evidently gave it up as a bad job and quit. I unlocked it, and when home, hammered out the bent metal, and it is now again ready to serve me.

Knowing that you would like a report of a practical application of its service, I write you.

MAIL COUPON NOW!

Forget about the price of the "Watch Dog." Think of what your car cost. And remember what danger it is in until the "Watch Dog" locks it against all chance of thievery. Mail the coupon now. Address

S. Breakstone
1712 MICHIGAN AVE. CHICAGO, ILL.

Order Coupon
S. Breakstone, Chicago, Ill.
1712 Michigan Ave., Chicago, Ill.
Name.....
Address.....
Here is my name and address.
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send me one "Watch
Dog" Lock
complete.

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Index to Advertisers.

Acme Auto Litter Co., ignition	77
Acme Torsion Spring Co., springs	98
Adamson Mfg. Co., vulcanizers	3d cover
Aermore Mfg. Co., signals	98
Alden Sampson Mfg. Co. (Sampson) automobiles	96
Alden Sampson Mfg. Co. (Sampson) (35) automobiles	96
Allen Auto Specialty Co., tire gauges	103
American Battery Co., storage batteries	97
American Electric Co., signals	98
American Tap & Die Co., screw plates	23
American Tire & Rubber Co., cement	13
Armiger Chemical Co., polish	22
Arsenal Varnish Co., varnish	21
Atlantic Machine Co., timer brackets	29
Atlas Auto Supply Co., repair outfits	92
Atlas Chain Co., tire chains	87
Atwater Kent Mfg. Works, ignition	85
Auburn Auto Pump Co., pumps	94
Automizer Co.	100
Automobile Advertising Co., advertising service	75
Automobile Supply Mfg. Co., signals	84
Automobile Tire Co., tires	22
Auto Directories Co., mailing lists	103
Auto Gas Lighting Co., ignition	99
Auto Parts Mfg. Co. (Milwaukee, Wis.) supplies	19
Auto Parts Co. (Providence, R. I.) supplies	88
Auto Specialty Mfg. Co., fore-doors	79
Auto-Tire Vulcanizing Co., vulcanizers	27
Baldwin Chain & Mfg. Co., chains	20
Barnes Drill Co., lathes	87
Barnes, W. F. & John Co., lathes	96
Battershall, F. W. & Co., gaskets	87
Benford Mfg. Co., timers and spark plugs	31
Best Ignition Equipment Co., spark plugs	32
Blackledge, John W., Mfg. Co., springs	104
Blenkinsderfer, G. C., spark plug	26
Borbein Auto Co., bodies	24
Breakstone S., locks	81
Brennan Motor Co., motors	87
Britson Mfg. Co., treads	80
Bridgeport Brass Co., pumps	96
Brilliant Gas Lamp Co., gasoline lighting system	87
Brown Co., pumps	92
Brush Runabout Co., automobiles	96
Buffalo Forge Co., tools	29
Buob & Scheu, auto tops	87
Burke Valve Co., valves	76
Butterfield & Co., screw plates	27
Candey-Otto Mfg. Co., tools	11
Canton Foundry & Machine Co., turntables and jacks	17
Cartercar Co., automobiles	30
Catlain, A. G., hose clamps	96
Champion Blower & Forge Co., tools	19
Champion Spark Plug Co., spark plugs	96
Clarke Carter Automobile Co., automobiles	96
C-M-B Wrench Co., wrenches	96
Colorado Tire & Leather Co., treads	3
Columbia Motor Car Co., automobiles	96
Comstock, Geo. S., air compressors	79
Courier, automobiles	96
Cray Bros., supplies	95
Crone, F. G., pumps	96
Curtis & Co., Mfg. Co., pumps	20
Davis Robe & Armor Co., treads	96
Dayton Motor Car Co., automobiles	96
Diamond Rubber Co., of N. Y., tires, tire stock	18
Dixon, Joseph, Crucible Co., lubricants	84
Double-Fabric Tire Co., tire lining	90
Dover Stamping & Mfg. Co., funnels	29
Draver Mfg. Co., cable supports	73
Duryea, C. D., Motor Co., automobiles	97
Edelmann, E. & Co., oil gauges	16
Endura Mfg. Co., packing	10
Eureka Auto Parts Mfg. Co., radiators	100
Excelsior Tire Co., tires	28
Felton, Sibley & Co., varnishes	12
Firestone Tire & Rubber Co., tire stock	6
Fisher & Norris, vises	87
Fowler Lamp & Mfg. Co., starters	91
Garage Equipment Mfg. Co., supplies	94
Gardner Governor Co., air compressors	79
Gardner Engine Starter Co., trusses	22
Geisler Bros., storage batteries	96
Gem City Liquid Vulcanizer Co., repair outfits	21
Gibney, Jas. L. & Bro., vulcanizers	87
Gilmer, Jr., G. Walker, pillars	80
Goodrich, B. F. Co., tires	95
Grant, H. M., fibre	97
Gray-Hawley Mfg. Co., cutouts	77
Gray Specialty Co., reliners	101
Great Amtrican Rubber Co., tires	87
Grossman, E. Co., spark plugs	79
Guide Motor Lamp Mfg. Co., lamps	28
Gun Metal Finish Co., polish	96
Gwyn-Bacon Vulcanizer Co., vulcanizers	96
Hagstrom Bros. Mfg. Co., spark plugs	14

Haight Auto Lighter Co., ignition	29
Harris, A. W., Oil Co., oil	87
Harris Oil Co., oil	30
Hart & Widder Co., pumps	96
Hathorn Auto Co., motor stands	86
Haws, Geo. A., oil	100
Hawthorne Mfg. Co., pumps	96
Haywood Tire & Equipment Co., vulcanizers	102
Hemmeter Spark Gap Mfg. Co., spark gaps	98
Hess-Bright Mfg. Co., ball bearings	2
Hickok Mfg. Co., monograms	28
Hinckley Machine Works, milling attachments	99
Hodge & Graves Co., automobile seats	94
Hopewell Bros., vibrators	79
Horsey Mfg. Co., patches	101
Hub Machine Welding & Contracting Co., welding	94
Hudson Motor Car Co., automobiles	96
Hull, R. C., Electric Co., ignition	8
Inner Shoe Tire Co., tire lining	9
Inst. Lighter Co., ignition	24
Jeffrey-Dewitt Co., spark plugs	103
John, H. W. Manville Co., asbestos fabrics and specialties, storage batteries	27
Jones, Phineas & Co., wheels	102
Keegan, Frank W., springs	87
Kellom, Chas. F. & Co., treads	89
Kimball Tire Case Co., treads	84
K-W Ignition Co., magnetos and spark coils	25
K. W. Mfg. Co., tire lining	4
Leather Tire Goods Co., treads	1
Lee Tire & Rubber Co., signals	101
Livingston Radiator & Mfg. Co., radiators	78
Lobe Pump & Machinery Co., pumps	79
Lortz, F. E. & Co., pumps	103
McGill Mfg. Co., lamps	30
McHose & Enck Mfg. Co., gloves	102
McIntyre, W. H. Co., automobiles	77
McLain, H. E. & Co., tire chains	98
Maxwell-Briscoe Motor Co., automobiles	96
Mayo Mfg. Co., pumps	85
M. & M. Mfg. Co., repair outfits	14
Meeker Mfg. Co., wheels	96
Mendenhall, C. S., road maps	96
Metal Body Tank & Fender Co., bodies and seats	18
Michener, E. S., carbon remover	24
Miller, Chas. E., vulcanizers	84
Milwaukee Pump & Tank Sales Co., pumps	14
Model Gas Engine Works, motors	21
Modern Auto Appliance Co., steering device	96
Moller Bros. Controller & Economizer Co., fuel economizer	8
Moore, J. C. & Co., packs	79
Morris, R. W. Mfg. Co., polish	16
Mosler, A. R. & Co., spark plugs	79
Mossberg, Frank & Co., wrenches	17
Motz Tire & Rubber Co., tires	79
National Gas Engine Starter Co., engine starters	28
National Motor Supply Co., vulcanizers	73
National Sales Corporation, break band lining	24
New York Coil Co., ignition	93
New York & New Jersey Lubricant Co., oil	7
Northwestern Chemical Co., cement	26
Oakland Advertising Co., rubber novelties	79
Ofeldt, F. W. & Son, boilers	87
O'Neil Tire & Protector Co., vulcanizers	96
Packard Electric Co., ignition cables	28
Page Lester Co., repair outfits	102
Peerless Accessories Mfrs., pumps	104
Perfect Mfg. Co., vehicle washers	87
Phillips-Lafitte Co., brazing compounds	100
Pitner Pump Co., pumps	96
Planhard Mfg. Co., carburetors	94
Porter, H. K., bolt clippers	87
Prest-O-Lite Co., tanks, tubes	86
Randall-Falchney Co., signals, terminals, spark plugs	95, 99
R-C-H Corporation, automobiles, 4th cover	96
Remy Electric Co., magnetos	104
Richardson Tire Co., repair outfits	79
Rie Nie Mfg. Co., radiator compound	94
Robinson, Wm. C. & Sons Co., oil	97
Royal Equipment Co., brake band lining	100
Rub-On Varnish Co., varnish	100
Rutenber Motor Co., motors	96
Sager, J. H. Co., shock absorber	97
Sampson, automobiles	96
Scaife, Wm. B. & Sons Co., gasoline outfits	100
Schrader's A. Son, tire gauges	32
Sealo Tire Co., cement	12
Sebastian Lathe Co., lathes	95
Security Co., patches	98
Seneca Falls Mfg. Co., lathes	103
Shaler, C. A. Co., vulcanizers	5
Shannon, T. R., polish	100
Sharp Spark Plug Co., spark plugs	32
Simkin Mfg. Co., ignition	75
Sparkler Mfg. Co., varnish	96
Spittdorf, Electrical Co., magnetos	29
Standard Brass & Iron Works, bumpers	96

Standard Woven Fabric Co., brake band lining	99
Stanley, John T., soap	97
Star Speedometer Co., speedometers	79
Star Vulcanizer Mfg. Co., vulcanizers	14
Steam Carriage Boiler Co., boilers	96
Stoddard-Dayton, automobiles	96
Stromberg Motor Devices Co., carburetors	96
Superior Motor Specialty Co., spark plugs	96
Sypher Mfg. Co., tools	102
35 Per Cent. Automobile Supply Co., supplies	79
Times Square Automobile Co., automobiles	93
Tingley, C. O. & Co., patches	30
Tobey, Wm. L., rim removers	87
Triple-Tread Mfg. Co., treads	88
Triumph Chemical Co., varnish	98
Troy Auto Specialty Co., signals	89
Tuthill Spring Co., springs	98
20th Century Tire Protector Co., treads	12
Underwood, H. B. & Co., cylinders re-bored	30
United States Motor Co., automobiles	96
United States Tire Co., tires	87
Universal Tire Protector Co., treads	26
Vacuum Oil Co., oil	77
Valentine & Co., varnishes	10
Vanderpool, Tire & Rubber Co., tires	96
Vanguard Mfg. Co., wind shield	79
Voorhees Rubber Mfg. Co., tire lining	8
Waban Webbing Co., tire lining	98
Ward, Edgar T. & Sons, spring winders, tubing	18, 23
Waterbury Welding Co., welding	27
Western Automobile Supply Co., inner casing	18
Western Robe Mills, buggy washers	16
Western Welding & Mfg. Co., welding	102
Whittaker Chain Tread Co., tire chains, 2d Cover	101
Wiley & Russell Mfg. Co., screw plates, tools	87
Williams Foundry & Machine Co., repair outfits	20
Williams, J. H. & Co., drop forgings	15
Winchester Machine Works, tools	24
Woven Steel Hose & Rubber Co., brake band lining	24
Zacharias, E. H., motors	104

Classified Buyers' Guide.

Advertising Service	
Automobile Advertising Co.	75
Air Compressors	
Comstock, Geo. S.	79
Gardner Governor Co.	79
Williams Foundry & Machine Co.	20
Aluminum Cases Repaired	
Hub Machine Welding & Contracting Co.	94
Waterbury Welding Co.	27
Aluminum Welding Composition	
Hub Machine Welding & Contracting Co.	94
Waterbury Welding Co.	27
Asbestos Fabrics and Specialties	
Johns, H. W., Manville Co.	27
Automobiles	
Alden Sampson Mfg. Co. (Sampson 35)	96
Alden Sampson Mfg. Co. (Sampson)	96
Brush Runabout Co.	96
Cartercar Co.	30
Clarke Carter Automobile Co.	96
Columbia Motor Car Co.	96
Courier	96
Dayton Motor Car Co.	96
Duryea, C. D. Motor Co.	97
Hudson Motor Car Co.	96
Maxwell-Briscoe Motor Co.	96
McIntyre, W. H., Co.	77
R-C-H Corporation	4th cover
Times Square Automobile Co.	93
United States Motor Co.	96
Automobile Seats	
Hodge & Graves Co.	94
Ball Bearings	
Hess-Bright Mfg. Co.	2
Bodies	
Borbein Auto Co.	24
Metal Body Tank & Fender Co.	18
Boilers	
Ofeldt, F. W. & Son	87
Steam Carriage Boiler Co.	91
Williams Foundry & Machine Co.	20
Bolt Clippers	
Porter, H. K.	87
Brake Band Lining	
Johns, H. W. Manville Co.	27
National Sales Corporation	24
Royal Equipment Co.	100
Standard Woven Fabric Co.	99
Woven Steel Hose & Rubber Co.	24

Bracing Compounds Phillips-Lafitte Co. ....100	Lubricants Dixon, Joseph, Crucible Co. 84	Signals Aermore Mfg. Co. 98 American Electric Co. 98 Automobile Supply Mfg. Co. 84 Lee Tire & Rubber Co. ....101 Randall-Faichney Co. ....95, 99 Troy Auto Specialty Co. 89
Bracing Powders Phillips-Lafitte Co. ....100	Mailing Lists Auto Directories Co. ....103	Soaps Stanley, John T. 97
Buggy Washers Western Robe Mills 16	Magnetos K-W Ignition Co. 25 Splitdorf Electrical Co. 29	Spark Gaps Hemmeter Spark Gap Mfg. Co. 98
Bumpers Standard Brass & Iron Works 96 Troy Auto Specialty Co. 89	Maps Mendenhall, C. S. 96	Spark Plugs Benford Mfg. Co. 81 Best Ignition Equipment Co. 32 Blickensderfer, G. C. Co. 26 Champion Spark Plug Co. 96 Grossman, E., Co. 79 Hagstrom Bros. Mfg. Co. 14 Jeffrey-Dewitt Co. ....103 Mosler, A. R. & Co. 79 Randall-Faichney Co. ....95, 99 Sharp Spark Plug Co. 32 Superior Motor Specialty Co. 96
Cable Support Draver Mfg. Co. 79	Milling Attachments Hinckley Machine Works 99	Speedometers Star Speedometer Co. 79
Carbon Removers Michener, E. S. 24 Northwestern Chemical Co. 26 Prest-O-Lite Co. 86	Monograms Hickok Mfg. Co. 28	Springs Acme Torsion Spring Co. 98 Blackledge, John W., Mfg. Co. ....104 Keegan, Frank W. 87 Tuthill Spring Co. 98
Carburetors Planhard Mfg. Co. 94 Stromberg Motor Devices Co. ....2d cover	Motors Brennan Motor Co. 87 Model Gas Engine Works 21 Rutenber Motor Co. 96 Zacharias, E. H. ....104	Spring Winders Ward, Edgar T., & Sons ....18, 23
Cement American Tire & Rubber Co. 13 Northwestern Chemical Co. 26 Sealo Tire Co. 12	Motor Stands Hathorn Auto Co. 86	Starters Fowler Lamp & Mfg. Co. 91
Chains Baldwin Chain & Mfg. Co. 20	Non-Conducting Coverings Johns, H. W. Manville Co. 27	Steam Packings Johns, H. W. Manville Co. 27
Clutches Williams Foundry & Machine Co. 20	Oil Gauges Edelmann E. & Co. 16 Troy Auto Specialty Co. 89	Steering Devices Modern Automatic Appliance Co. 96
Outouts Gray-Hawley Mfg. Co. 77	Oils Harris Oil Co. 30 Harris, A. W. Oil Co. 87 Haws, Geo. A. ....100 Kellom, Chas. F. & Co. ....102 New York & New Jersey Lubricant Co. 7 Robinson, Wm. C. & Son Co. ....97 Vacuum Oil Co. 77	Storage Batteries American Battery Co. 97 Gelscher Bros. Storage Battery Co. 96 Johns, H. W. Manville Co. 27
Cylinders Bored Underwood, H. B. & Co. 30	Packing Endura Mfg. Co. 10	Supplies Auto Parts Mfg. Co. (Milwaukee, Wis.) 19 Auto Parts Co. (Providence, R. I.) 88 Cray Bros. 96 Garage Equipment Mfg. Co. 94 35 Per Cent. Automobile Supply Co. 79
Detachable Treads Leather Tire Goods Co. 1	Patches Gray Specialty Co. ....101 Horsey Mfg. Co. ....101 Security Co. 98 Tingley, C. O. & Co. 30	Tanks Prest-O-Lite Co. 86
Directories Auto Directories Co. ....103	Phiars. Glimmer, Jr., G. Walker 10	Timers Benford Mfg. Co. 31
Drop Forgings Williams, J. H. & Co. 15	Polish Armiger Chemical Co. 22 Gun Metal Finish Co. 96 Morris, R. W. Mfg. Co. 16 Shannon, T. R. ....100	Timer Brackets Atlantic Machine Co. 29
Electrical Supplies Johns, H. W., Manville Co. 27 Grant, H. M. 97	Pumps Auburn Auto Pump Co. 94 Bridgeport Brass Co. 96 Brown Co. 22 Crone, F. G. 96 Curtis & Co., Mfg. Co. 20 Gardner Governor Co. 79 Hart & Widder Co. 96 Hawthorne Mfg. Co. 96 Lobe Pump & Machinery Co. 79 Lortz, F. E. & Co. ....103 Mayo Mfg. Co. 85 Milwaukee Pump & Tank Sales Co. 14 Peerless Accessories Mfrs. ....104 Pitner Pump Co. 96 Prest-O-Lite Co. 86 Troy Auto Specialty Co. 89	Tire Chains Atlas Chain Co. 87 McLain, H. E. & Co. 98 Whittaker Chain Tread Co. ....101
Engine Starters National Gas Engine Starter Co. 28	Radiators Eureka Auto Parts Mfg. Co. ....100 Livingston Radiator & Mfg. Co. 78	Tire Gauges Allen Auto Specialty Co. ....103 Schraeder's, A., Son. 32
Fire-Proof Cements Johns, H. W. Manville Co. 27	Radiator Compounds Rie Nle Mfg. Co. 94	Tires Automobile Tire Co. 22 Diamond Rubber Co. of N. Y. 18 Excelsior Tire Co. 28 Goodrich, B. F., Co. 95 Great American Rubber Co. 87 Motz Tire & Rubber Co. 79 United States Tire Co. 87 Vanderpool, W. 96
Fore-Doors Auto Specialty Mfg. Co. 79	Radiators Repaired Livingston Radiator & Mfg. Co. 78	Tire Lining Double-Fabric Tire Co. 90 Inner Shoe Tire Co. 9 K. & W. Mfg. Co. 4 Voorhees Rubber Mfg. Co. 8 Waban Webbing Co. 98
Friction Clutches Williams Foundry & Machine Co. 20	Beliners Gray Specialty Co. ....101	Tire Kettles Williams Foundry & Machine Co. 20
Fuel Economizers Moller Bros. Controller & Economizer Co. 8	Repair Outfits Atlas Auto Supply Co. Front cover, 92 Gem City Liquid Vulcanizer Co. 21 Gray Specialty Co. ....101 M. & M. Mfg. Co. 14 Page-Lester Co. ....102 Richardson Tire Co. 79 Williams Foundry & Machine Co. 20	Tire Molds Williams Foundry & Machine Co. 20
Funnels Dover Stamping & Mfg. Co. 29	Re-Treading Rings Williams Foundry & Machine Co. 20	Tire Repair Equipment Williams Foundry & Machine Co. 20
Gaskets Battershall, F. W. & Co. 87	Rim Removers Tobey, Wm. L. 87	Tire Stook Diamond Rubber Co. of N. Y. 18 Firestone Tire & Rubber Co. 6
Gasoline Lighting System Brilliant Gas Lamp Co. 87	Rubber Novelities Oakland Advertising Co. 79	Tools Buffalo Forge Co. 29 Canedy-Otto Mfg. Co. 11 Champion Blower & Forge Co. 19 Sypher Mfg. Co. ....102 Wiley & Russell Mfg. Co. 87 Winchester Machine Works 24
Gasoline Storage Outfits Scalfe, Wm. B. & Sons Co. ....100	Screw Plates Butterfield & Co. 27 Wiley & Russell Mfg. Co. 87	Top Dressing (auto) Felton, Sibley & Co. 12
Gloves McHose & Enck Mfg. Co. ....102	Seats Metal Body Tank & Tender Co. 18	Tops Buob & Scheu 87
Hose Clamps Catelain, A. G. 96	Shock Absorbers Sager, J. H. Co. 97	
Ignition Acme Auto Litr Co. 77 Atwater Kent Mfg. Works 85 Auto Gas Lighting Co. 99 Haight Auto Lighter Co. 29 Hull, R. C., Electric Co. 8 Inst. Lighter Co. 24 New York Coil Co. 93 Packard Electric Co. 28 Simkin Mfg. Co. 76		
Inner Casing Western Automobile Supply Co. 18		
Jacks Moore, J. C. & Co. 79		
Lamps McGill Mfg. Co. 30 Guide Motor Lamp Mfg. Co. 28		
Lamps (side and tall) Guide Motor Lamp Mfg. Co. 28		
Lathes Barnes Drill Co. 87 Barnes, W. F. & John Co. 96 Sebastian Lathe Co. 95 Seneca Falls Mfg. Co. ....103		
Locks Breakstone, S. 81		
Lock Washers K-W. Ignition Co. 25 Remy Electric Co.104		

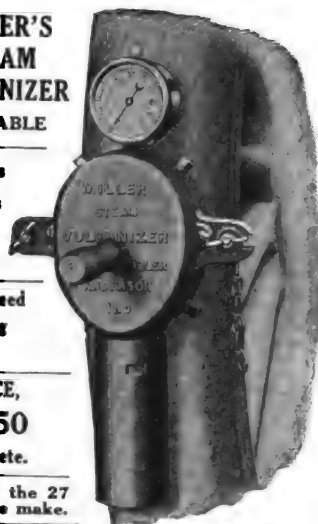
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Tubes		Vulcanizers		Jones, Phineas & Co.	102
Prest-O-Lite Co.	86	Adamson Mfg. Co.	3d cover	Meeker Mfg. Co.	96
Tubing		Auto Tire Vulcanizing Co.	27	Wind Shields	
Ward, Edgar T. & Sons	18, 23	Gibney, Jas. L. & Bro.	87	Grossman, E., Co.	79
Turntables		Gwyn-Bacon Vulcanizer Co.	16	Vanguard Mfg. Co.	79
Canton Foundry & Machine Co.	17	Haywood Tire & Equipment Co.	102	Wind Shield Glass Cleaners	
Valves		Miller, Chas. E.	84	Grossman, E., Co.	79
Burke Valve Co.	76	National Motor Supply Co.	73	Wrenches	
Vehicle Washers		O'Neill Tire & Rubber Co.	96	C. M. B. Wrench Co.	96
Perfect Mfg. Co.	87	Shaler, C. A., Co.	5	Mossberg, Frank & Co.	17
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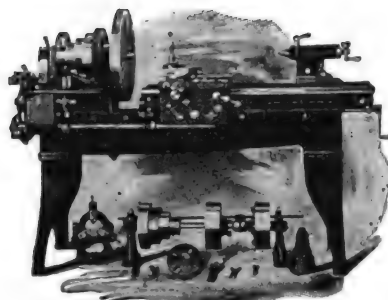
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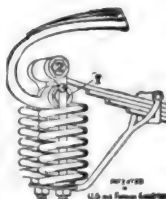
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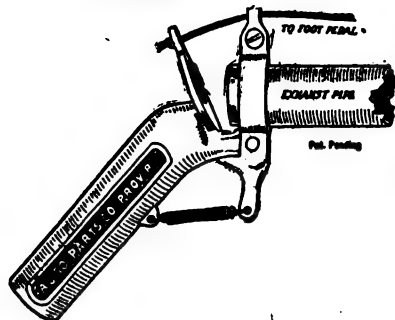
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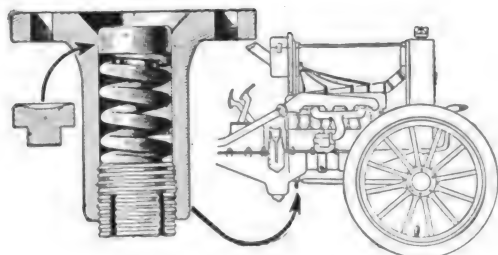
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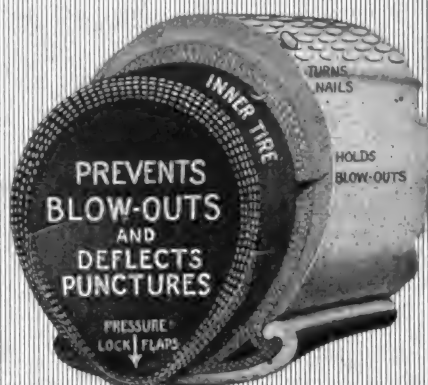
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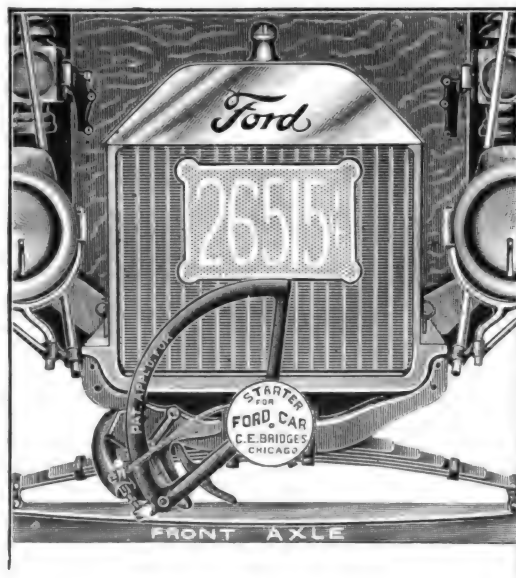
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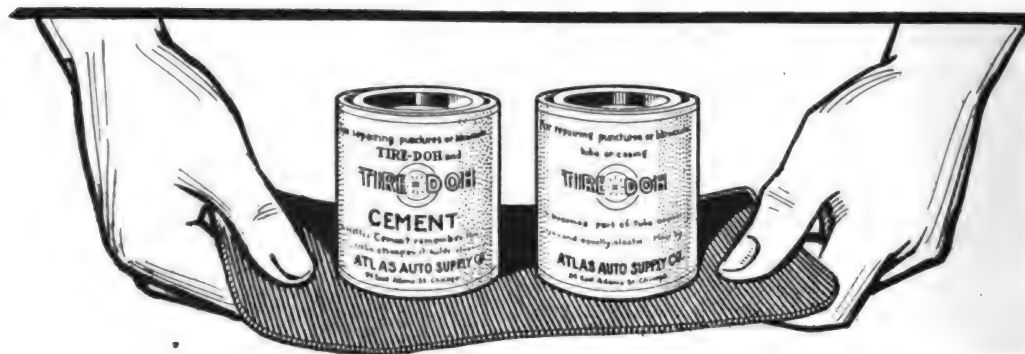
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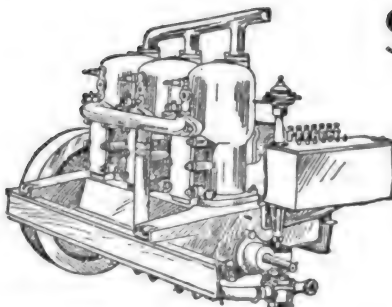
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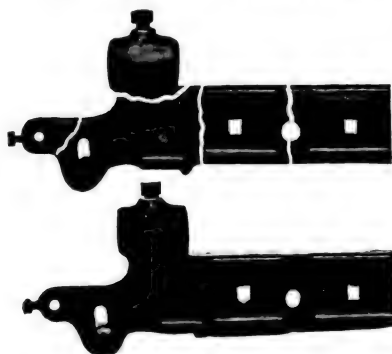
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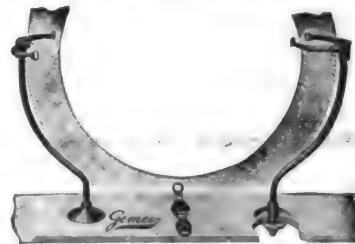
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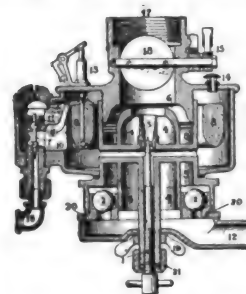


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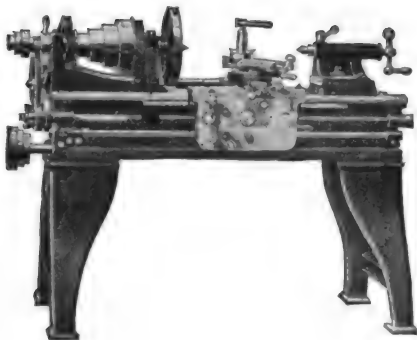
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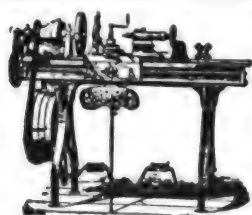


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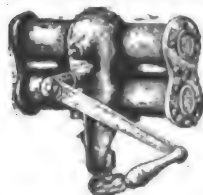
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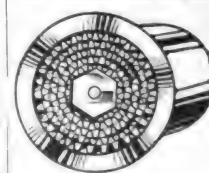
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Nothing equals it to keep your car New

Because it is a vegetable-oil soap, containing no free alkali or gritty substance, Mobo may be safely used to remove dirt and grease from any automobile and bring out the glossy finish.

The free alkali in ordinary soap destroys the lustrous finish—cracks the varnish and eats the paint.

Mobo is a linseed-oil preparation. Consequently Mobo actually nourishes the paint and varnish and preserves the highly polished surface of an automobile.

Mobo gets after the dirt.

It will take all the travel stain off your machine and make it look like new.

And it's easily used—with water and a sponge.

The sales of Mobo have increased greatly—that's the best proof it's all right. Everybody who knows Mobo uses it to take off the dirt and grease. Do you know Mobo?

MOBO is the only automobile soap that is actually good for the car.

Write for Booklet "How to Keep an Automobile Clean and Bright," sending us your Dealer's Name.

JOHN T. STANLEY
Maker of Fine Soaps
644 West 30th St., New York City

Sold in cans, half barrels and barrels, by all supply dealers.

STORAGE BATTERIES



FOR AUTOMOBILES—
ALL STYLES

RECTIFIERS

ALL SIZES

FOR CHARGING FROM AN A-C CIRCUIT




AMERICAN BATTERY COMPANY
1136 FULTON ST. CHICAGO, ILL.
ESTABLISHED 1899

AUTOMOBILES COST TOO MUCH

per mile for your everyday work. Lots of people have found this out; and the sooner you discover it, the better for you. Gasoline, repairs and tires cost money. You can save nearly all this by using the high-grade motor buggies made by us. They are so amazingly simplified that there is nothing to get out of order, and so they are always ready to go through sand, mud or snow.

You can use them all winter. They are comfortable, stylish, and fast enough.

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Sheets, Rods, Tubes and Special Shapes for Automobile Work

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SAGER SHOCK ABSORBERS


Have proven for seven years to be mechanically correct. Prevent recoil and bumping of springs; thereby reducing car maintenance to a minimum.

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EQUALIZERS SUCCEED WHERE OTHERS FAIL

Thousands of Dollars Saved Annually by Use of Sager Bumpers. Don't Wait for a "Smash-up" to Buy Protection. Do it Now.

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Used Almost Exclusively on High Grade Cars

Clamped on Bumpers of Distinction, Attached in Ten Minutes.

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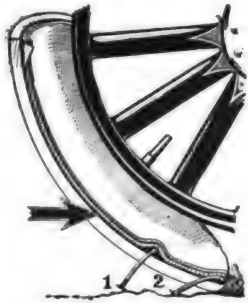


J. H. SAGER CO.
291 South Ave.
ROCHESTER, N. Y.

ROCHESTER



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1. Shows webbing taking nail.
2. Turning nail.

PROTECT THE INNER TUBE

As long as the inner tube is strong and inflated you have no tire troubles nor anxiety on the road.

Waban Webbing—a heavy woven webbing placed between inner tube and casing—takes and turns nails or other objects that pierce the shoe. Puncture is practically impossible under all conditions of use. The added strength reduces the possibility of blow-outs.

Waban Webbing "BULLET PROOF"

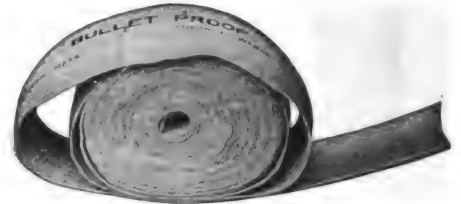
has no bias places to pinch—will not heat—conforms to shape of tire. It gives protection where it is needed. Easily inserted in a few minutes.

PRICES, delivered to any address, charges prepaid (for one tire):

28 x 3 or 3½	\$2.00	32 x 4	\$2.70	34 x 4½	\$3.15
30 x 3½	2.15	32 x 4½	3.00	36 x 4	2.95
30 x 4	2.40	34 x 3½	2.50	36 x 4½	3.25
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Write for new booklet, "Lengthen the Life of Your Tires."

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THE HEMMETER SPARK GAP

This Will
spark make
gap old
will plugs
keep fire
your as
plugs good
clean. as
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MANUFACTURED BY

The Hemmeter Spark Gap Mfg. Co.
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At
last
an
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horn
that
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CLOG

The loudest and most musical warning signal on the market for automobiles, motor boats and motor cycles.
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DEALERS—GET OUR SPECIAL OFFER
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"SAMSON" Electric Horn



No. 1
Samson Horn
Push and Cord
6/10 ampere at
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Cast Brass Base.
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jector, 9 in. long.
12 ft. Cord and
Push

STRONG-LOUD
SIMPLE-RELIABLE

MADE ONLY BY
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Suitable to all makes and models of cars. They go on any car like any other spring. Guaranteed absolutely. If broken through the center for any reason will replace at any time, and no questions asked. No center hole—the curved center and retaining plate hold the spring positively. No breakage—no hole to break in. Has already been tested on 8000 cars.

We Make All Other Styles of Springs

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"THE CHAIN THAT LASTS"

The "BEST" Traction Chain

What wears out first on your chains? Let us tell you why ours last longer than others.

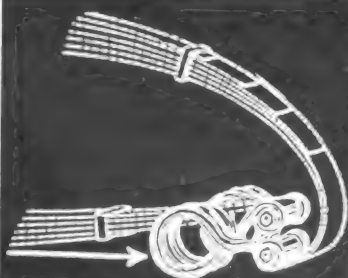
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PACIFIC COAST AGENT: JOHN F. REVALK, 405 Golden Gate Avenue, San Francisco, Cal.

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"Don't Jounce" "Don't Bounce"
PUT THESE ON YOUR CAR

Don't be fooled by "shock absorbers." What you want is more spring capacity under proper Automatic Control. Acme Torsion Springs add at least 18 feet to the total leaf spring area, every inch adding greater resiliency automatically controlled. Acme Torsion Springs stop vibration, prevent spring crystallization and breakage, minimize tire and engine trouble, and improve the riding qualities of any car at least 75%. They cost less than half the price of shock absorbers, and are worth several times as much.

Eliminate Vibration and you eliminate trouble. Adaptable to all types of leaf springs. Quickly and easily applied by any one. Satisfaction guaranteed. We have convinced thousands, let us convince you. Write to-day for information.



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The Only Way to Brighten your Automobile, Carriage and Buggy Seats and Tops is to use
SUPERIOR LEATHER VARNISH

The Best Water-proof Coating known for Leather Goods of Every Description. It stands the sun and rain in any climate, will not crack nor blister, produces a high class natural finish, will not rub off nor become sticky, contains no acid and is guaranteed not to injure the finest leather. Easily applied with an ordinary brush. Dries thoroughly in 30 minutes.

Send for price list to-day.

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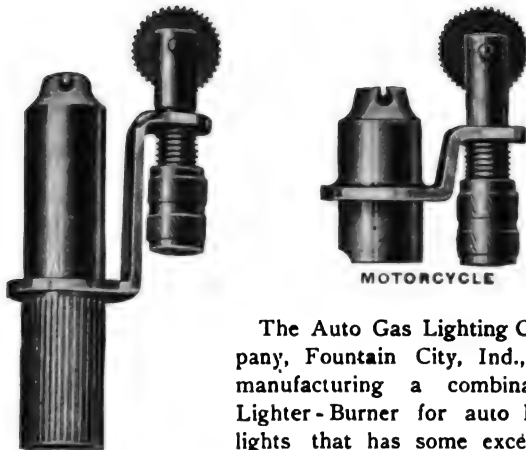


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Doing what?
Repairing their punctures with
Security Self-Vulcanizing Patches.
Sold by most dealers, or sent post-
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The Security Co., 25 SHIMMIS STREET
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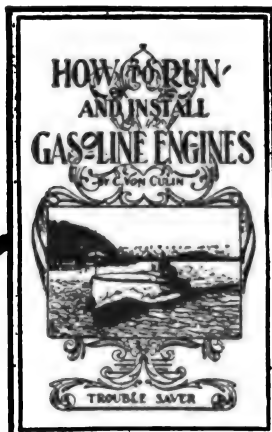
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The Auto Gas Lighting Company, Fountain City, Ind., are manufacturing a combination Lighter-Burner for auto head lights that has some excellent features, enough of them to interest every auto owner. The Lighter is attached to the burner, is always ready, and lights the gas regardless of wind, snow or rain. The burner furnished with each Lighter is "something different" in the way of gas burners. It is an armless one gas way, FLAT FLAME burner that never cracks reflectors. It is the only burner of the kind made and is fully protected by patents; finally, the price is reasonable. Send \$1.50 and get a sample pair by mail. Money refunded without argument if not satisfactory. Send for full particulars anyway. You get that for the asking. Address

THE AUTO GAS LIGHTING CO.

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A copy will be sent you on receipt of the price, 25 cents, in postage stamps.

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Listen! Everywhere You Hear the Bugle Note of

Jericho ONE TONE *Horn* *Jubilee* CHIME TONE *Horn*

The Signal of a Gentleman — Warns Without Offence

JERICO Saves 50% of installation cost. Saves 100% of maintenance cost, because there isn't any. It **Saves Money** saves accident costs because it prevents them.

JERICO Pleases the public. Enables you to signal with your foot, leaving your hands free. Saves you **Saves Trouble** controversy, for it warns unmistakably and melodiously.

Any motor car agency, accessory dealer or garage will sell and put on a Jericho or Jubilee — and the entire cost will be less than \$10.



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The Efficiency of your Automobile Brake is measured by the Quality of the Brake Lining.



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is unfailing and guarantees perfect brake action under all conditions of service.

Send for Book, "Safe Within the Grip of Multibestos."

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The DAVIS MILLING ATTACHMENT and COMPOUND TABLE

Has Circular Base for clamping to any Drill Press Table, with Dovetail Cross Slides, operated with Screws and Ball Cranks, by hand. Saddle is graduated and swivels to any angle. Table is slotted for clamping down work, Chuck or Vise. Handy for large shops, when the big machines are tied up, for spotting castings, milling off ends of bosses, etc.; for small shops that cannot afford expensive machines; diemakers, locksmiths, pattern makers, repairmen and automobile garages. It will cut key seats and mill cams. For use with end mill, fishtail cutter or formed cutters.

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THE HINCKLEY MACHINE WORKS,
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"AUTOMIZER"



Leads them all, Saves 10 Times its Cost in Gasoline, gives more power, transforms every particle of gasoline into a fine mist and sends it in a whirling volume to combustion chambers; no moving parts, never wears out. Easily attached to any car. Write for prices to the trade, or send \$1.00 for sample, postpaid, giving model, H. P., and make of car.

We quote extracts from hundreds of unsolicited testimonials.

"Rush this order, they sell fine since we have them started."—Rehn & George, Wapak Garage and Manufacturers of Gas Engines, Wapakoneta, O.

"The Automizer received and immediately put to use; would not do without it; enclose check for two more. I believe they can be sold to every man that owns a car."—S. P. Wilson (Postmaster), Wood River, Neb.

"I find that the use of your Automizer increases my mileage on Studebaker-Garford Car from 9-10 to 13-14 miles per gallon, and after a thorough test I find that it actually does all that you claim."—George S. Raley (County Judge and Surrogate), Glens Falls, N. Y.

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"Sold over 100 from our Garage. Benefit new as well as old cars."—Frank L. Cole.

"One of our customers is using your Automizer. Before doing so he was getting 16 miles. The first time he measured he got 20 miles; on the second filling 23, third filling 22, etc."—Motor Supply Shop (Jobbers Auto Supplies), Columbus, Ohio.

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Gasoline Storage Outfits

contain no complicated parts to get out of order.

A Welded Tank is the ideal construction for holding gasoline.

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CLEAN and POLISH YOUR CAR WITH- OUT THE USE OF WATER,

By Using

THE RAPID AUTO CLEANER and POLISH



Will remove mud, grease and dust, and spots of all kinds. When applied, the Rapid Auto Cleaner and Polish dries quickly, by rubbing the surface with a dry, soft cloth. It leaves the surface free from moisture, gum, grease, or soil of any sort which will stick to the hands or clothes. It can be applied to any surface without fear of damaging the same.

Used in thousands of garages and carried in stock by most supply dealers.

Dealers, write for special proposition. If your dealer does not carry this article I will send liberal FREE sample. If you mention this magazine.

WHEN ONCE USED, ALWAYS USED.

Put up in 12 ounce bottles, . . . \$0.50
Put up in 1 quart bottles, . . . 1.00
Put up in 1 gallon jugs, . . . 3.00

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EUREKA

DIAMOND HONEY COMB RADIATOR

All radiating surfaces—no fins—one of the most efficient coolers made. Very strong and handsome. Built in any size and design, and for any truck, automobile, or aeroplane.

"WILL OUT-LIVE YOUR CAR"

Absolute satisfaction guaranteed
High class radiator repairing

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BRAZING PLATES

THE PHILLIPS-LAFFITTE CO., Penna. Bldg., Phila., Pa.

Three grades to meet all requirements.
No. 1 for brazing brass, copper and bronze.
No. 2 for brazing copper and iron.
No. 3 for brazing iron and steel.
SAMPLES FREE

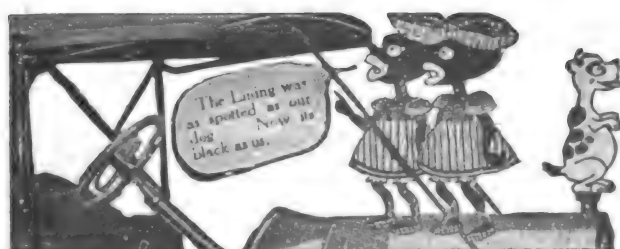
If all oils are alike, we are wasting time and money in making
PANHARD OIL
the highest quality that can be produced. Write for new booklet.
GEORGE A. HAWS, 67 Pine St., New York.

THE ROYAL EQUIPMENT CO.

Manufacturers of

Raybestos DUPLEX
TRADE MARK
BRAKE LINING
EXTERNAL BRAKES

450 Housatonic Ave., Bridgeport, Conn.



Rub-on Auto Top Lining Dye

Colors every spot or streak an even black at one application with a sponge without removing the top. It is insoluble in water and cannot soak up or run when the top is wet.

Rub-R-Tite Auto Top Waterproofing
Gum-surfaces all tops of cloth or other material, making them look like expensive leather, except it is more elastic and has a closer fold.

Send for FREE Samples of top that proves what they will do. Sold by nearly every dealer in America

Col-R-Of Leather Dyes

Black, green, maroon, red or tan. Same colors and finish that tanners use. Fast colors that do not stiffen the leather. No primers required to use this DYE as it is not paint colors.

Rub-On Varnish—Runs On With a Cloth

Is not sticky like other varnish. Faded hoods and fenders refinished in an hour: the lustre lasts for months. Restores faded paint to its original color, protects it from the elements

RUB-ON VARNISH COMPANY
360 Elm Street, Buffalo, N. Y., U. S. A.

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THE WAYMAKER HORN

The best auto horn - and the best advertised

Through the *Saturday Evening Post* alone, we are reaching **2,000,000** circulation, or **ten million readers**, at the accepted average of 5 readers per copy.

Through *Cosmopolitan*, *Everybody's*, *McClure's*, *Review of Reviews*, *Collier's Weekly*, *Life*, *Literary Digest*, *Hearst's Magazine*, *American Motorist*, *Motor Car*, *Motor*, *Motor Print*, *Auto Trade Journal*, *The Automobile*, *Motor World*, and *The Horseless Age*, we are reaching over **3,400,000** additional circulation (or another seventeen million readers, if you want complete figures).



This means orders for you.

If you want them, stock-up at once on the **Waymaker Horn**. Write today for our trade proposition, our descriptive booklet I, and the **Waymaker Data Book**, showing how our simple coupling system enables you to fit any car from a minimum stock of couplings. Newspaper editors of this cut, duplicating the text run in the *Saturday Evening Post*, with liberal space for your story and address, sent free if you handle the **Waymaker**.



LEE TIRE & RUBBER CO.
CONSHOHOCKEN, PA.
J. Ellwood Lee, President

"Turns Miles into Smiles"

ATTENTION OF THE TRADE!

Copy of letter sent to Weed Chain Tire Grip Co. by the Whittaker Chain Tread Co., to which Weed people have never replied:

BOSTON, MASS., July 1, 1912.

WEED CHAIN TIRE GRIP CO.,

28 Moore St.,

New York City, N. Y.

GENTLEMEN:

Our attention has recently been called to your ad. of Motor Cycle Tire Chains in the *Bicycle World* and the *Motorcycle Review*, wherein you say, "The Most Wonderful Invention of the Year." As this appears in the 1912 issue, it would therefore read to the public as an invention of this year. We want to call your attention to the fact that as long ago as 1909, this Company made Motorcycle Tire Chains, and further we desire to call your attention to the fact that as long ago as 1889, the Treasurer of this Company made and used a Bicycle Chain identical in every way with the Motor Cycle Chain we are now putting out, except where we now use Triumph Pattern Side Chain and a nice neat little Snap. The writer at that time used a plain German Bright Coil Chain of a small size with common harness snap, and the Loop End Hooks that we now use to connect the Side Chains to the Cross Chains were made in the same way then that they are made today.

Therefore, in the matter of fairness and equity, we ask you to correct your advertisement in the future to correspond with the facts of the case.

Yours truly,

(Signed) WHITTAKER CHAIN TREAD CO.,

C. E. Hobbs, Treas.

HORSEY

THAT'S THE NAME

ONE
MINUTE
REPAIR



USE
GASOLINE
ONLY

No Cement

No Acid

Inner Tube Patch

One trial of Horsey No Cement Patches and you will consign Cement and Acid Repair methods to the scrap heap and be dollars ahead by doing it.

Large Kit, box contains 12 assorted (large and small) patches, **\$1.00**.

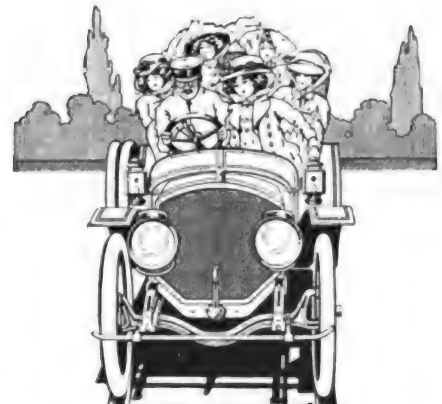
Small Kit, box contains 8 assorted (small) patches, **50 cents**.

Manufactured exclusively by

The Horsey Manufacturing Co.

5606 Euclid Ave., Cleveland, O.

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ANYWHERE
ANY SPEED

GRAY'S NEWARK RELINERS

TAKE THE WORRY
OUT OF TIRES

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Blow-out Patches, Tube Patches, No-Cement Patches, Cements, Tire Chalk, Valve Grinding Outfits, Bumpers, Tire Paint, Rubber Putty, Tool Boxes, Etc.

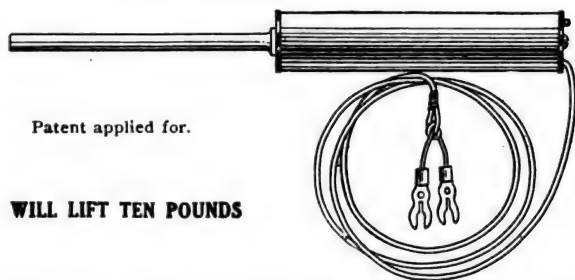
ALL GUARANTEED

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Patent applied for.

WILL LIFT TEN POUNDS

This magnetic lifting tool is used for taking out nuts, cotter pins, bolts or tools that are dropped into the crank case or transmission case. Is operated on two or four dry cells or storage battery. Will pay for itself on one job. Never wears out. Weight 2½ lbs. Length 12 inches. Every garage should have one. Great seller for dealers.

Write at once for Descriptive Circular. Price \$3.00.

SYPHER MANUFACTURING CO., 2208 Warren Street, TOLEDO, OHIO.

HAYWOOD STEAM VULCANIZERS THE PROFIT MAKING PLANTS



The vulcanizing system that DOES NOT use air bags. SOLID PADS and HEAVY CLAMPS are the means through which pressure is generated.

Plants from \$25 to \$500

Write for Catalog

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Save TIME and MONEY

Automobile Truck Users.

Send your wheels that need repairing to

PHINEAS JONES & CO.,

Phones 1871 } Market.
1872 }

NEWARK, N. J.

Or to Branch Factory, 12th Ave. and 55th Street,

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NEW YORK CITY.

Full Equipment of the Latest and Best Machinery.

WELDING AUTOMOBILE PARTS



Cracked or Broken

Cylinders, Crank Shafts,
Crank Cases, Housings, Frames,
Axles, any metals of any shapes or
thicknesses, including

ALUMINUM PARTS

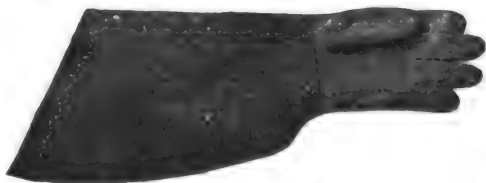
All work
absolutely
GUARANTEED

Manufacturers of welded (seamless) gasoline and oil tanks.

Write for estimates.

Complete Oxy-acetylene Welding and Cutting Plants Installed.

Western Welding & Mfg. Co., 557 & 559 W. Jackson Boulevard, Chicago, Ill.



The M. & E. REPAIR GLOVE

Water and Grease Proof

Keeps Your Hands and Sleeves Clean

Send for Illustrated Circular, or order Sample pair, \$1.00—
Prepaid, Six pairs, \$5.00.

Dealers, ask for quantity price.

McHOSE & ENCK MFG. CO., ASHLAND, O.

"TITE-WAD"

"CAN'T TEAR IT OFF"

The Rubber Putty.

Repairs Tires—both casings and inner tubes or anything made of rubber WITHOUT VULCANIZING, and at one-tenth the cost.

Biggest Seller for Dealers. Because the greatest time and money saver for owners. NO TOOLS BUT THE HANDS required and repairs can not be made better by any method or apparatus.

We Guarantee the User Satisfaction or Money Back.

REPAIR SHOPS

Many of them now use "TITE-WAD" exclusively in repairs. Cost one-tenth of vulcanizing, takes less time, results are better, more profit.



Page-Lester Co., Omaha Bldg. Chicago, Ill.

Special Request

IN writing to advertisers for circulars or information, you are earnestly requested to mention in each case that the advertisement was seen in the "Automobile Dealer and Repairer." By so doing you will confer a favor on both publisher and advertiser

Invader Gear Oil

Puts Noisy Gears to Sleep



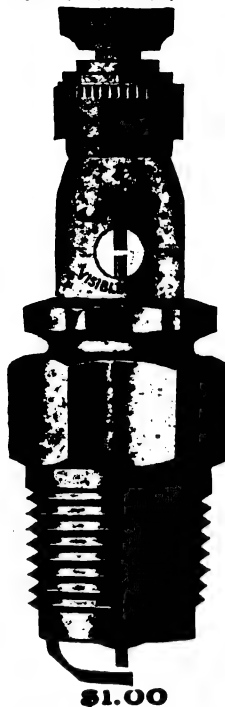
This is a fluid lubricant. It is always uniform, 100% oil of the same strength, contains no water or chemicals. Will not foam in the case when running or rust bearings when remaining idle. It is a stronger and more economical lubricant than any grease made, including our own.

Sold in ten pound, twenty-five pound and fifty pound cans.

Chas. F. Kellom & Co., 113 Arch St. Philadelphia
New England Branch, 284 Columbus Ave., Boston

Let this Spark Plug solve your ignition troubles

The new principle embodied in the **J-D Visible Gap Spark Plug** enables you to locate ignition trouble at a single glance. Through the port in the porcelain—**outside** the motor—you see if the spark is jumping the gap in the central electrode.



\$1.00

No more need to hunt and test and fuss. If the spark jumps, the plug must be foul or carburetion is faulty; if not, then trouble is behind in wiring or coil or batteries. Knurled adjusting nut allows you to widen or close gap. Opened, it intensifies spark and cleans spark point automatically. Uses minimum current, makes timing of engine easy, and permits regulating of spark in any cylinder.

One look tells everything

Will you test a set of these unique plugs at our risk? We will send you a set prepaid upon receipt of price (specify size wanted and make of car). Back of every plug we put our ironclad guarantee "absolute satisfaction or your money back." Your word goes. We make millions of plugs a year—nothing else—of finest materials, even importing our clays and other ingredients for our porcelain that defies heat. Price of this plug—just \$1.00, same as any good plug.

Will you write us today? And ask us too for our **FREE** book on ignition—a classic with motorists.

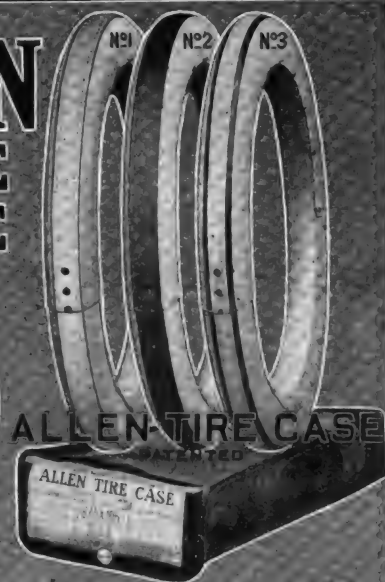
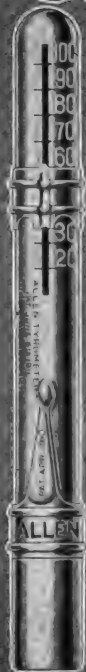
JEFFERY-DEWITT COMPANY

553 Butler Avenue,

DETROIT, MICHIGAN

ALLEN TIRE CASE

PRICES
\$3.00 UP



ALLEN TYROMETER

TIRE PRESSURE GAUGE
HIGHEST IN EFFICIENCY
ABSOLUTELY ACCURATE



THE ALLEN AUTO SPECIALTY CO.
MANUFACTURERS

1926 Broadway, New York

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IRVIN SILVERBERG & CO.

541 Van Ness Avenue, San Francisco

\$1.00

PEERLESS TIRE PUMP, \$15.00



A child can operate it. Just turn the handle.

Fits in tool box.

Write for Information Regarding
PEERLESS PUMP

F. E. LORTZ CO., 2503 E. 55th St., Cleveland, Ohio

Auto Directories Co., Inc.

CERTIFIED COPIES OF THE OFFICIAL LIST OF AUTO OWNERS, CHAUFFEURS, DEALERS, GARAGES, MANUFACTURERS AND JOBBERS IN THE U. S. AND CANADA. ALSO MOTOR BOAT OWNERS.

Offices, 1717 Broadway
NEW YORK CITY

Phone 353 Columbus.



"STAR" LATHES

9 in., 11 in., 13 in. SWING.

Suitable for fine accurate work in the garage, repair shop, tool-room and machine shop.

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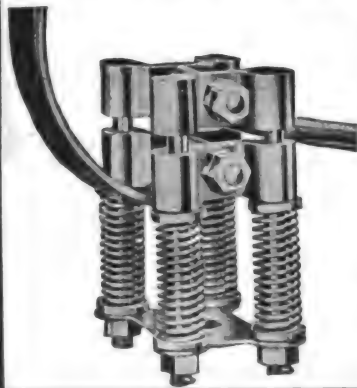
429 Water Street, SENECA FALLS, N. Y.

A-1

TABLE OF CONTENTS

PAGE	PAGE	PAGE
Electric Vehicles33	Radiator Cleaning46	Wheels54
Dodging Trouble .....37	Current Does Not "Catch On" .....46	Wanted—More Idle Rich .....55
Wear of Paint and Varnish .....39	May Be Too Much Gasoline .....46	The Only Safe Way .....55
A Nail in a Tire .....40	No Other Way .....46	Doubting and Believing .....55
Big Export Automobile Trade .....40	Thinks It Is Out of Balance .....47	A New Form of Crime .....55
Splash Lubrication .....40	A Bad Grinding Noise .....47	Nothing Permanent but Actions .....56
The Care of Detachable Wheels.....40	Has No Power on Low .....47	A Privilege and Not a Right.....56
Garage Methods .....41	A Peculiar Popping .....47	A Long Struggle .....56
Testing Gasoline .....41	Fixed Spark Trouble .....48	No Rubber Shortage .....56
Better Solid Tires .....41	Starting and Certain Other Matters....48	A Weak Magneto .....57
Small Cars and Large .....42	His Front Cylinder .....48	The 1913 Schacht Car .....57
Descending a Hill .....42	Cylinders Misfire .....49	Washing the Car Correctly.....57
A Knock in the Motor .....42	A Rumbling Transmission .....49	Lessons for Drivers .....58
Ignition Trouble .....42	He Surely Has a "Grouch" .....49	Artificial Rubber .....58
Grating in the Ford Transmission ...42	For Missing When Throttled .....49	Tire Overloading .....59
Carburetor Adjustment .....43	The Buick Model 1910 .....49	The Body Builder .....59
Who Can Solve This? .....43	This May Cause the Rattle .....50	The Repair Shop .....60
Missing Explosions .....43	Foot Lever Rattle. ....50	Pneumatic Tires .....62
Fire Extinguishers .....43	Lubricants for the Flanders .....50	Rights of the Road .....64
Must Be Looked Over .....44	Rattle and Solder Globules .....50	Trade Paper Advertising .....64
Convenient But Unnecessary .....44	He Wants to Give Them a Boost .....50	Claim They Save Power .....64
Some General Principles .....44	The Ford Rattling Sound .....50	Engine Repairs .....65
Overheats .....44	Air-Cooling Efficiency .....50	Who Can Afford a Car .....66
A Good Expense Record .....44	Brakes and Their Effect on Tires .....50	Testing an Automobile .....66
A Clicking Sound .....44	Interchangeable Bodies .....51	Value of Advertising .....67
The Accelerator .....45	Death of A. W. Harris .....53	Air Cooling .....67
Don't Make; Buy .....45	How Accidents Are Reduced .....53	Valve Timing .....68
Magneto Trouble .....45	Automobile Prices .....54	Faulty Carburetion .....68
Needs a Different Carburetor45	Vice, Per Se54	Steam Car Department69
Transmission Trouble46		

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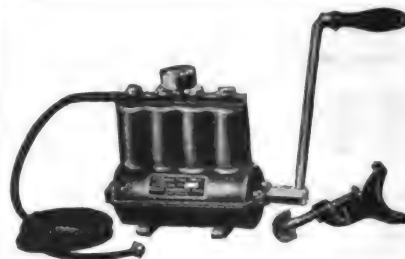
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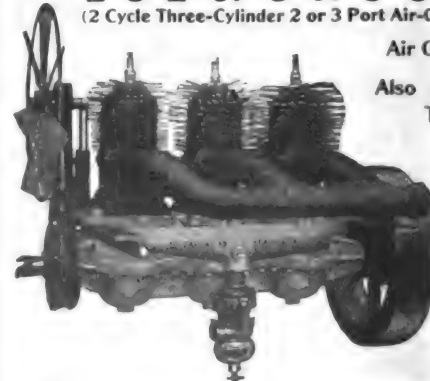
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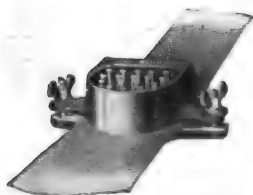
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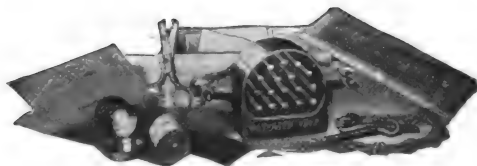
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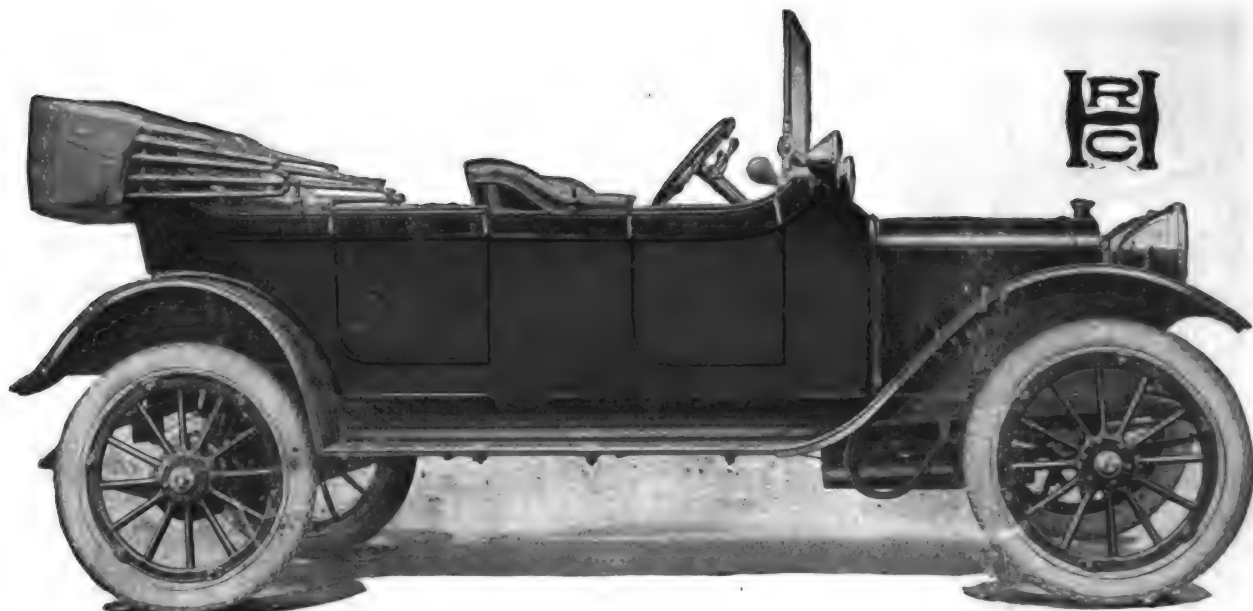
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